The RUBBER AGE

September, 1943

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SEP 28 1943
DETROIT

CAPTAX-ALTAX

These are still good general purpose accelerators, as found in the past, regardless of the Rubber Hydrocarbon now being vulcanized.

Now that GR-S is actually in extensive commercial usage and the results of service performance are becoming known, it is being realized that overcures with consequent low elongations are increasingly dangerous.

CAPTAX and ALTAX alone do not over-cure GR-S; they may with good results be slightly activated when desired for very short cures.

R. T. VANDERBILT CO., INC.

230 Park Avenue, New York City

Newsletter No. 9
SEPTEMBER, 1943

Published by Rubber Chemicals Division of DU PONT

Now Is The Time To Make High-Grade Products

THE time is fast approaching when synthetic elastomers will be produced in large quantities and will be available freely for many uses for which they could not be allowed previously. Rubber technologists will want to use them to make the highest quality items possible.

High-quality products can be made from neoprene. In the case of soles and heels, neoprene-carbon black compositions will, in severe service, outperform soles and heels made from any other elastomer including rubber. High grade neoprene soles may cost more per pair than those made of elastomer-reclaimed rubber mixtures, but they will be more economical in service by outwearing several pairs of other types of soles.

In the pre-war days before restrictions were placed on the use of rubber and synthetics, high carbon black-neoprene soles were used extensively on work shoes because they outwore leather and rubber soles in severe service. These service conditions not only involved oil, solvents and chemicals to which neoprene is conceded to be very resistant but also the crushed rock of railroad tracks and strip mines and coarse concrete of factories and garage yards. Such experience can only indicate that neoprene soles are of superior quality.

A high quality sole must wear well and resist cutting and chipping and also must flex without cracking across the ball of the foot or at the stitches throughout its service life. A good, well made neoprene sole of the proper hardness will do this. We recommend the compositions shown in Table I for high quality neoprene soles and heels.

TABLE I

Compound No.	721N-18 Neoprene Sole	1719N-11 Neoprene Heel
Neoprene Type GN	100.	100.
NEOZONE A	2.	2.
THERMOFLEX C	1.	—
Sodium Acetate	0.5	0.5
Stearic Acid	3.	1.
Extra Light Calcined Magnesia	4.	4.
Channel Carbon Black	80.	50.
Carbonex S	15.	—
Light Process Oil	—	12.
Dibutyl Sebacate	10.	—
Zinc Oxide	5.	5.
Factory Cure:	10 minutes at 316°F.	
Neoprene by Volume:	51.2%	63.4%
NOTE: Dibutyl sebacate was used in Compound No. 721N-18 to improve flexibility at sub-zero temperatures.		
PHYSICAL DATA—10 MINUTES AT 316°F. CURE		
Modulus at 300% Elong.—psi	1775	1675
Tensile Strength at Break—psi	2125	2775
Elongation at Break—%	460	500
Hardness—Shore Type A	83	68-70
Abrasion Resistance—du Pont Abrader (unaged)* (CC Loss per Horsepower Hour)	74	179
Abrasion Resistance—du Pont Abrader —After Aging 7 days at 70°C.—Geer Oven	221	210
Abrasion Resistance—Corresponding Bureau of Standards Value†	100+	100+
Resistance to Flex Cracking (Hours Run on Sole Flexer)‡	110	‡
Low Temperature Flexibility—58°F. (SAE-ASTM Bent Loop Method)	OK	
Specific Gravity	1.41	1.37

*The extremely low abrasion loss (74 cc) of the unaged neoprene sole may lie open to question but was obtained on repeated tests. It may be due to some kind of lubrication of the abrading surface though there was no evidence of smearing on the sandpaper discs used. It is probable that the abrasion loss (221 cc) on the aged sole more nearly indicates the true wearing resistance of the stock.

†Taken from conversion curve comparing du Pont and Bureau of Standards Abraders as shown in blue sheet report, BL-40.

‡At the end of 110 hours a sole made from the above formula was only slightly cracked at the stitches. For comparison an industrial rubber sole would show equal flex cracking in 40 hours when tested under similar conditions. No flexing tests were made on the heel stock since flexing is of negligible importance in heels.

Soles and Heels Made of Elastomer Reclaimed Rubber Compositions

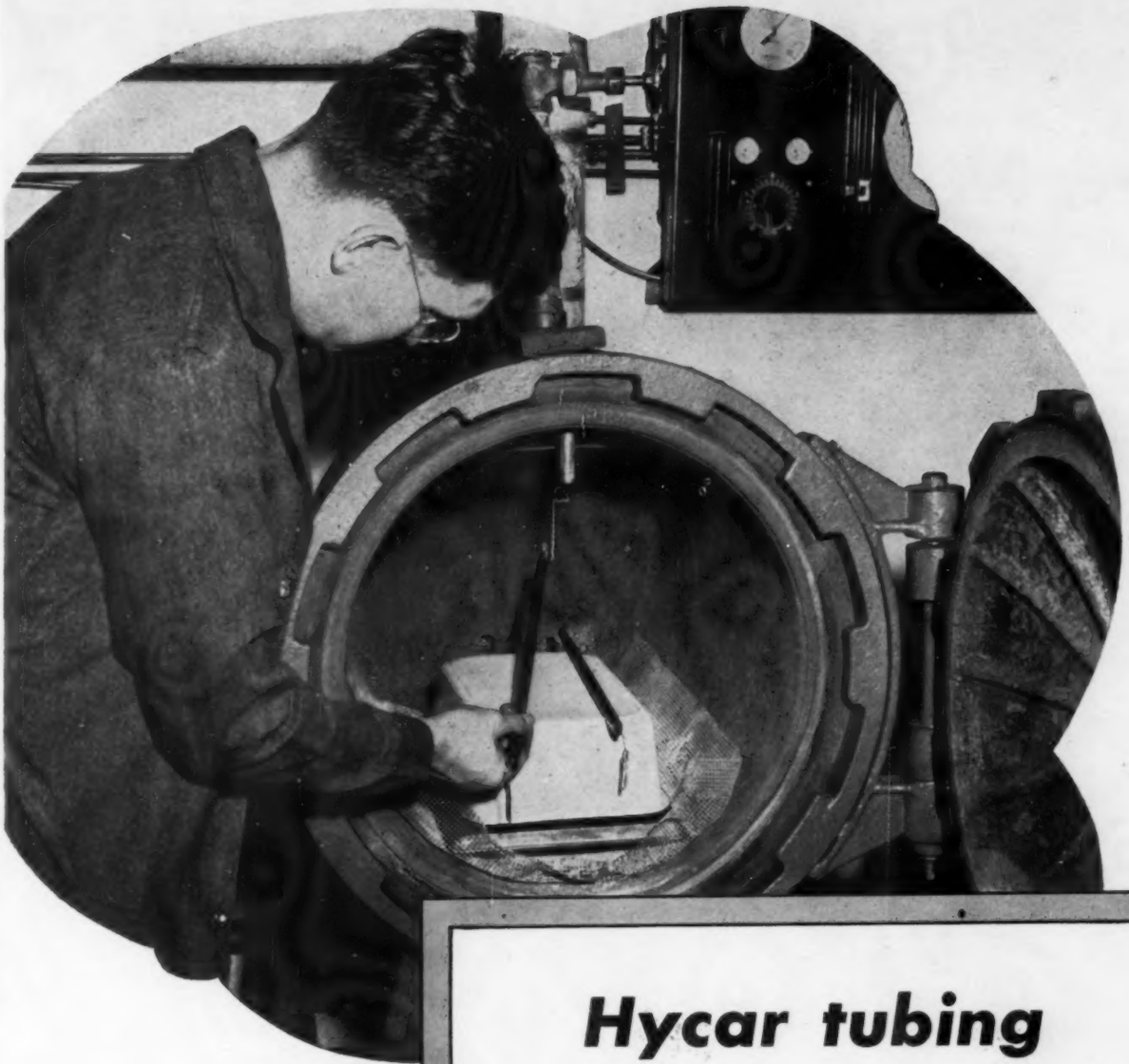
Our recommendations for soles made with neoprene-reclaimed rubber and GR-S-reclaimed rubber are shown in our informal report BL-100, published May 15, 1943. Soles made from these recommendations are good but are, of course, inferior to the all-neoprene sole as is shown by a comparison of physical properties—see Table II.

TABLE II

	All Neoprene GN Carbon Black Sole 721N-18	Neoprene GN Reclaimed Rubber Sole 721N-3	GR-S Reclaimed Rubber Sole 721N-1
Neoprene by Volume—%	51.2	40.0	—
RHC from Reclaim by Volume—%	—	9.6	14.5
GR-S by Volume—%	—	—	35.0
Modulus at 300% Elong. psi	1775	1650	1475
Tensile Str. at Break psi	2125	1850	1525
Elongation at Break—%	460	415	305
Hardness—Shore Type A	83	90	88
Abrasion Resistance—du Pont Abrader (CC Loss per Horsepower Hour)	74	400	660
Abrasion Resistance—Corresp. Bureau of Standards Value	100+	69	46
Resistance to Flex Cracking (Hours Run on Sole Flexer)	110	80	24
Low Temperature Flexibility— —50°F. (SAE-ASTM Bent Loop Method)	OK	OK	OK

DU PONT
RUBBER CHEMICALS DIVISION
BETTER THINGS FOR BETTER LIVING . . . Through Chemistry

THE RUBBER AGE, published monthly by The Palmerton Publishing Co., Inc., Printing Office, East Stroudsburg, Pa. Editorial and Advertising Offices at 250 West 57th Street, New York 19, N. Y. Entered as second class matter October 20, 1933, at the Post Office at East Stroudsburg, Pa., under the Act of March 3, 1879. Subscription in United States, $3.00 a year; Canada, $3.50; Foreign, $4.00. September, 1943. Vol. 53, No. 6.



Hycar tubing takes the cure

IN this picture laboratory samples of Hycar tubing are being placed in an autoclave for an open-steam cure at the Hycar Customer Service Laboratory.

There's nothing unusual about the process, but there are some distinctly unusual things about the results that this laboratory produces for synthetic rubber fabricators.

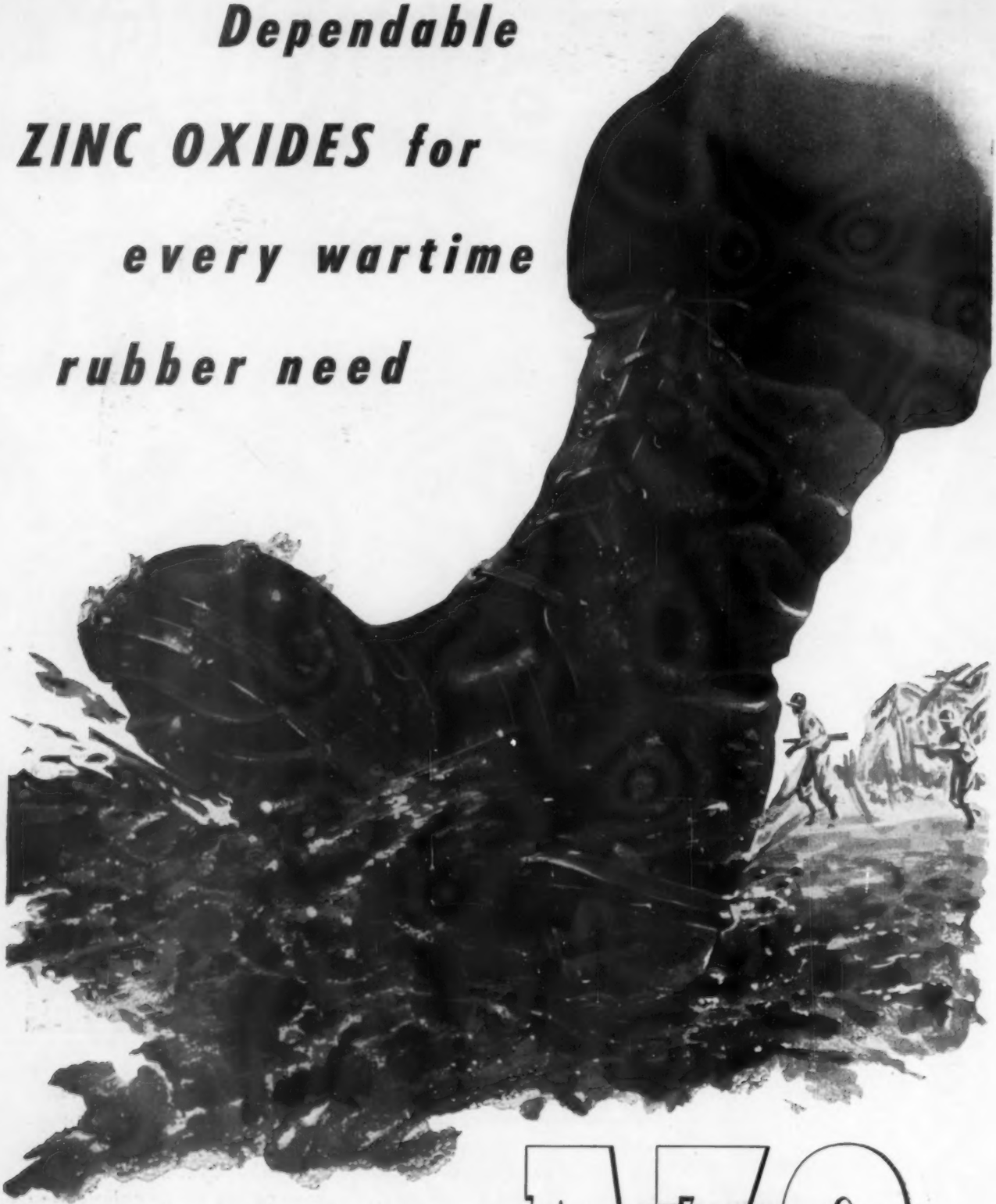
Whatever the problem, open-steam or press cures, tubing, calendering, compounding or testing, Hycar's wealth of experience and special abilities in synthetic rubber are *your* shortcut to the answer.

The complete facilities of this laboratory and its trained personnel are at your service. We urge you to take full advantage of them. *Hycar Chemical Company, Akron 8, Ohio.*

Hycar

LARGEST INDEPENDENT PRODUCER OF BUTADIENE *Synthetic Rubber* IN AMERICA

Dependable ZINC OXIDES for every wartime rubber need



AZO

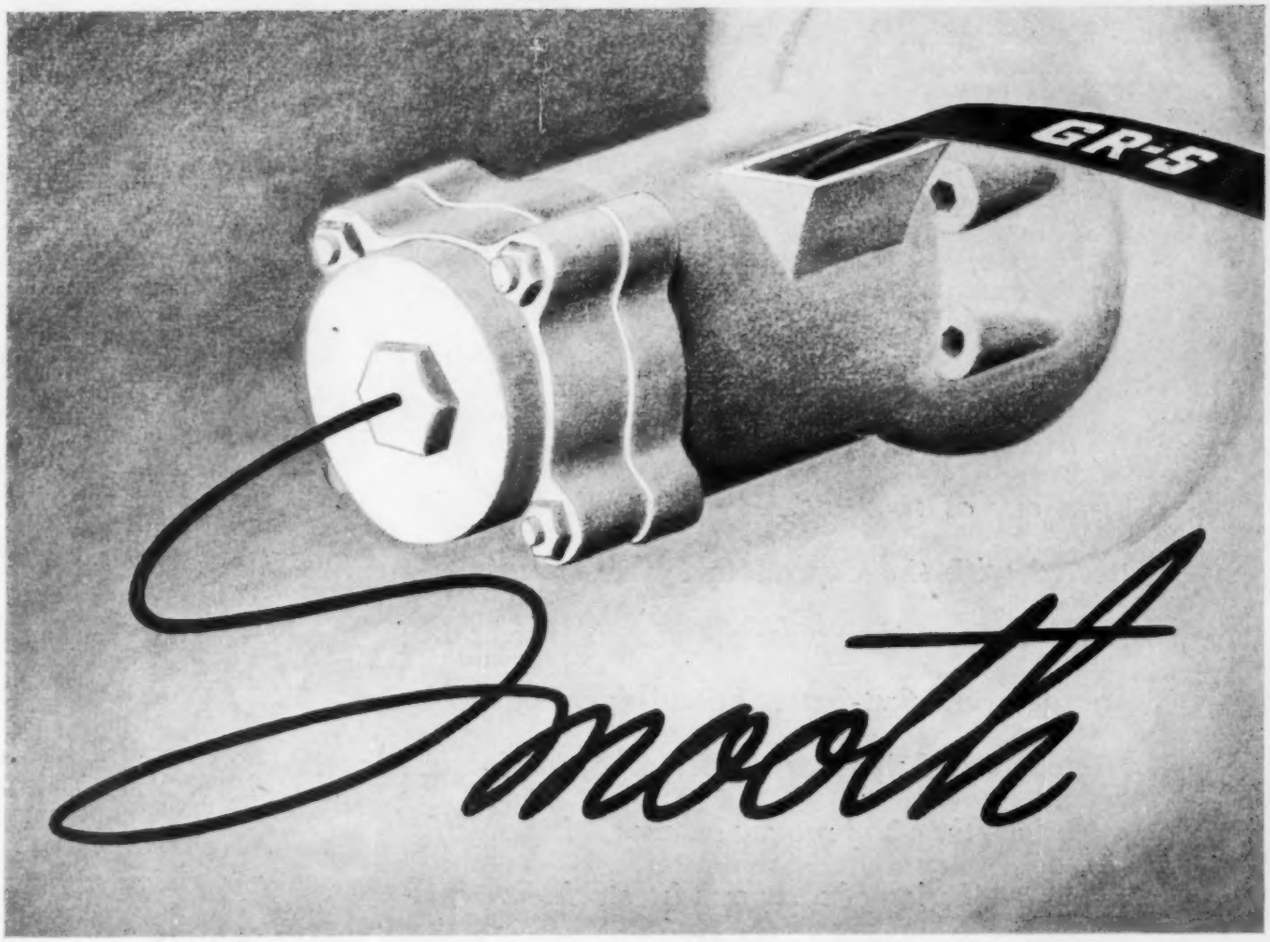
ZINC OXIDES

AMERICAN ZINC SALES CO., Distributors for AMERICAN ZINC, LEAD & SMELTING CO.

COLUMBUS, OHIO - CHICAGO - ST. LOUIS - NEW YORK

NAFTOLEN . . . *the solution to your*

GR-S Extrusion Problems



Smooth extrusion of GR-S stocks can be obtained through the use of large proportions of NAFTOLEN (50 or more parts for every 100 parts of GR-S). The NAFTOLEN swells the GR-S, reducing the "nerve" of the stock to a minimum. NAFTOLEN is an unsaturated hydrocarbon which reacts with sulfur during vulcanization. Therefore proper sulfur is necessary for optimum results.

WILMINGTON CHEMICAL CORPORATION

10 East 40th Street, New York 16, N. Y.

Plant and Laboratory: Wilmington, Delaware

W
-C=C-

A TIP

from One Who Knows!

★

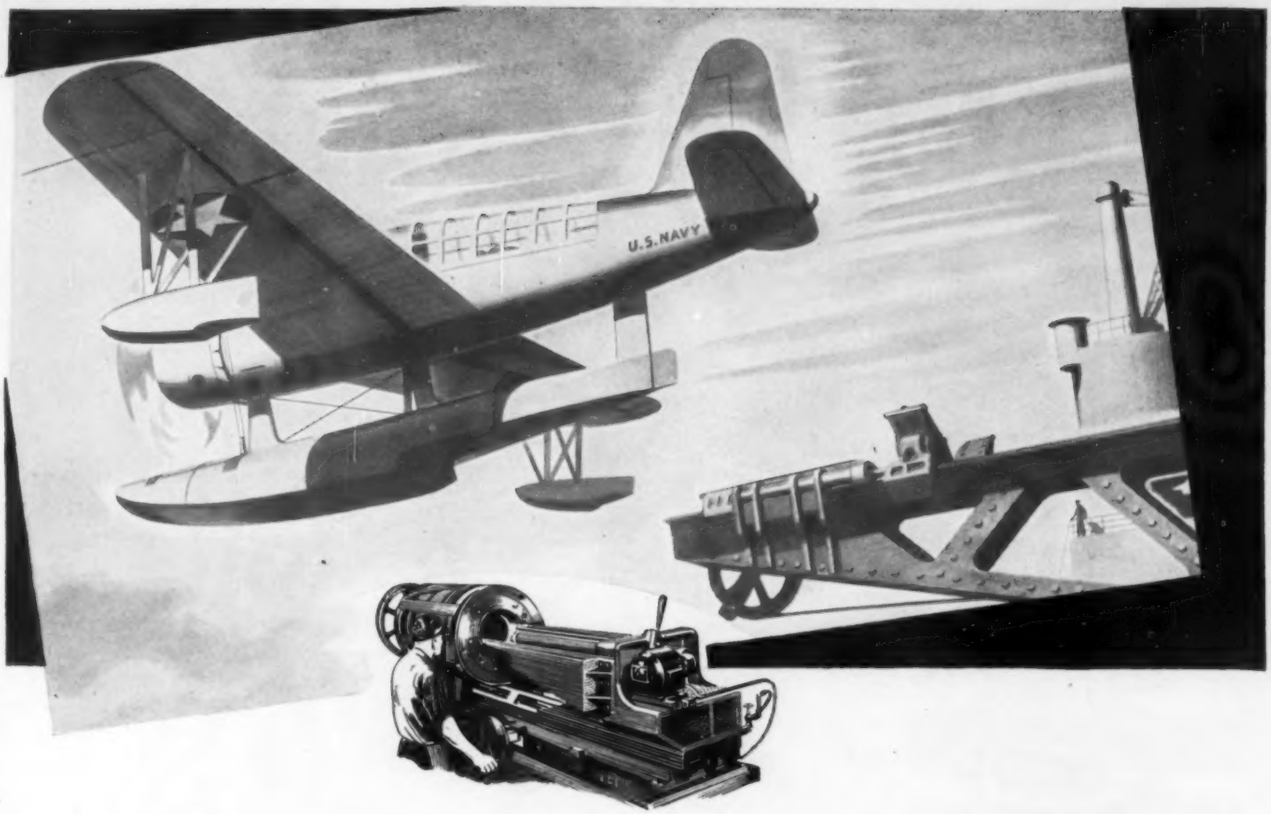
"I'm one of those who sent in a liner to be treated with the Capitol Process Treatment—and I am more than pleased that I did, for I now know from first-hand knowledge how this treated liner helps our plant to economize on materials, time and money because it has greatly reduced adhesion of compounded stock. Further, it has enabled us to lower materially our purchases of cotton piece goods."*

*** The offer is still open: Send us a 50- or 100-yard liner and let us treat it gratis so you can test it in your own plant. No obligation, of course.**

TEXTILE PROOFERS, INC.

181-193 Culver Ave., Jersey City, N. J.

Originators of the Capitol Process Liner Treatment



It pulls the punch of a catapult

LAUNCHED by a shipboard catapult, a plane is shot from its carriage like an arrow from a bow. Seventy miles an hour in 70 feet! The plane roars off. But the carriage . . . ?

What keeps the carriage from taking the end right out of the launching track?

The answer lies in a big hydraulic shock-absorber. It cushions the wallop with a piston that works against fluid in a cylinder. To allow fluid to bypass the piston the cylinder wall is grooved with a recess of precise shape and depth.

Because of past experience in tooling out tread designs in tire molds we were asked to do the "engraving" inside these catapult cylinders. It calls for machine tools that will reach into a cylinder and, like a dentist's drill, carefully cut the required recess in the cylinder wall.

Where did we get such machines? Why, we designed and built them. In developing special machines for the rubber and plastics industries, National has been tackling just such jobs for years.

NATIONAL RUBBER MACHINERY COMPANY

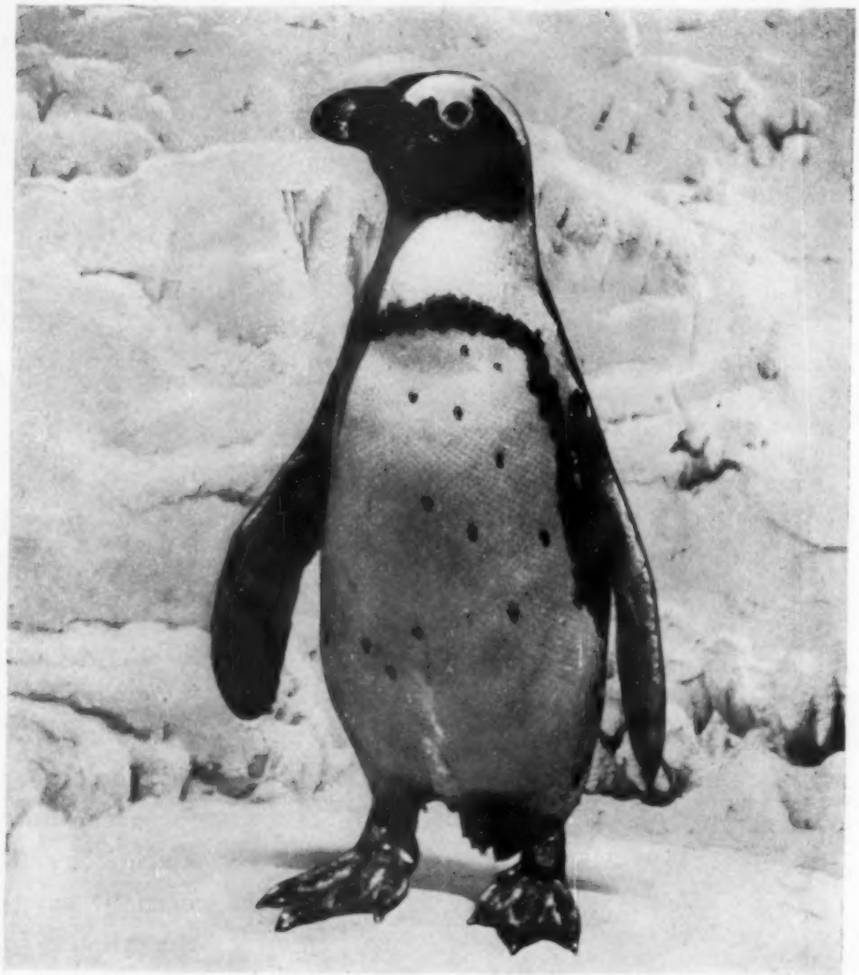
General Offices: Akron, Ohio

ARMY NAVY
CLIFTON DIVISION

CREATIVE ENGINEERING

WHEN PENGUINS SHIVER!...

PERBUNAN



Perbunan remains flexible and holds a tight seal even at Polar temperatures. The entire production of this oil-resistant synthetic rubber is now going into military planes, ships and weapons.

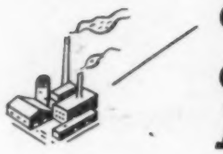
Write STANCO DISTRIBUTORS, INC.
26 Broadway, New York City

WAREHOUSE STOCKS IN NEW JERSEY, LOUISIANA AND CALIFORNIA

PERBUNAN

Want or failure } Prevented

On this Battle-Front of Production Unlimited Availability of Compounding Needs is Assured!



There are enough compounding materials for the Synthetic Program . . . Maybe not those materials you think you must have for certain purposes, but others that can take their places with equal efficiency—often with better results. In the Standard Chemical Line there are *Precision Materials* that meet every requirement—and they are available without limit. Para Coumarone Indene Resins, Piccolyte Terpene Resins, Plasticizers, Dispersing Oils, Softening Oils —all with broad ranges in specifications. If your needs call for special specifications they can be met also . . . Want or failure will be prevented. We are ready to help.

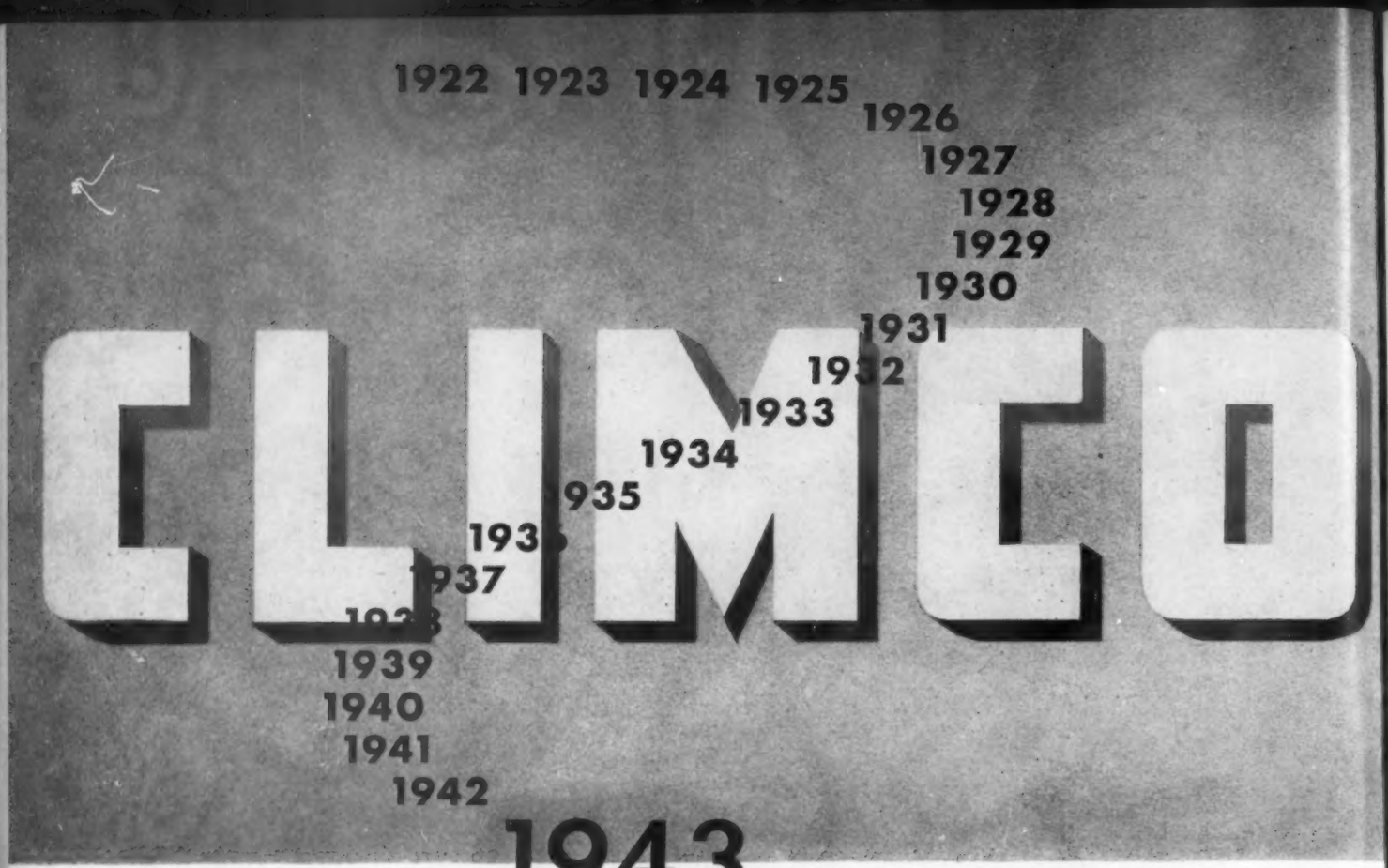
We can match any specification on —

Para Coumarone Indene Resins, Dispersing Oils, Softening Oils . . .

Advise us of your requirements and we will tell you how quickly we can supply them.

STANDARD
Chemical Company

AKRON SAVINGS AND LOAN BLDG. AKRON, OHIO



THE LEADING PROCESSED LINER FOR OVER 22 YEARS

CLIMCO Processing has stood the test of time and many changes in the rubber industry. Soon after its introduction in 1922 the Climco treatment was acknowledged as the best method of processing liners. Today it is still unrivaled in popularity.

Climco's success is not difficult to explain. This tough, flexible glaze applied to the liner guarantees better separation and banishes stock adhesions. Thus it saves: (1) repairs due to sticking and tearing, (2) constant cleaning between trips to the calender, (3) rerolling for cooling. Climco reduces labor and power costs, and also lengthens the life of the liner.

Today you can't afford to take a chance with your liners. Protect them with processing of *proven* quality. Have your liners "Climcoed."

THE CLEVELAND LINER & MFG. CO.
CLEVELAND, OHIO

LINERETTE
INTERLEAVING PAPER
Treatment Contains
NO OIL OR WAX
Samples on Request

CLIMCO PROCESSED LINERS

FOR FASTER, BETTER PRODUCTION AT LOWER COST

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

Can you get

each of your employes to

BUY AN EXTRA $100 BOND

in September?

That's the problem.

That's the job of the Third War Loan.

The objective is to raise fifteen billion dollars. No one ever set out to raise fifteen billion dollars at one time before in all the history of the world. To raise that kind of money, you have to go where the money is . . . the idle money.

72% of all the *idle* money is estimated to be in the hands of people who work for wages.

They are the employes on your *payroll* and the employes on other business men's *payrolls*.

You are the quickest, most direct route to those millions of men and women.

You know them.

You have access to them.

They are *your* particular *prospects*.

If you can get each of them to buy at least one extra $100 war bond (price: $75), in addition to their regular payroll deduction purchases, the Third War Loan will be a success.

We are listing below some of the things you can do to help sell an extra bond to each one.

Will you do them?

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

HERE'S HOW TO DO IT!

This brief outline was prepared expressly for your use by a nationally-known firm which recently directed a successful war bond selling drive among a large group of Koppers employes.

You have undoubtedly served on some money-raising campaign in your city . . . for your favorite hospital, or community fund, or Red Cross.

You know how those campaigns are organized.

Organize one in your own plant or plants for the Third War Loan.

1. Appoint a campaign committee, or have the labor-management committee appoint one.

2. Head it up with a chairman who is aggressive and a go-getter.

3. Have committees set up for each shop or each department. Organize them as teams, to compete with each other. Americans love competition . . . we love to make a game of our work. Appoint leaders for all committees and give them military titles.

4. Appoint a campaign manager who can devote full time to the campaign until you reach your goal.

5. Start with a big rally. Get your local Army or Navy office to send officers and men to take part in the rally, or have a returned war hero appear, for morale purposes. If you are working on war work make some special shipment as part of that rally.

6. Put up exhibits and posters around the plant which you can get from your local War Loan headquarters.

7. Have a bulletin board on which you can post daily the *percentage* of employes who have signed up in each department or on each team.

8. Have some newspaper publicity about what you are doing. It will encourage your people and will help the company, too. Tell the publicity director of your local War Bond campaign what you are doing.

9. Where employes are unable to afford a $75 expenditure for a $100 war bond, encourage them and members of their families to sell war stamps to their friends and neighbors and credit these sales against the team total.

10. End the campaign with a rally and honors or prizes for the biggest producers or hardest workers.

KOPPERS COMPANY AND AFFILIATES, PITTSBURGH, PA.

KOPPERS

★ ★ ★ ★ ★ **THE INDUSTRY THAT SERVES ALL INDUSTRY** ★ ★ ★ ★ ★

REMEMBER?...

Then TITANOX pigments gave unexcelled whiteness and brightness to all types of rubber products.

Today they do the same wherever white, natural or synthetic rubber stocks are desired.

TITANOX-A represents the greatest whiteness and highest tinting strength obtainable in opaque white pigments.

TITANOX-C has reinforcing qualities which in conjunction with low specific gravity and high tinting strength, make its use advisable where high pigmentation is desired.

TITANOX Rubber Pigments

TITANOX-A (titanium dioxide) and TITANOX-C (titanium calcium pigment) are the outstanding white pigments for rubber compounding. Since their introduction no white pigment has been developed which offers greater advantages.

TITANIUM PIGMENT CORPORATION *Sole Sales Agent*

111 B'way, New York, N. Y. 104 So. Michigan Ave., Chicago, Ill. • 350 Townsend St., San Francisco, Cal. • 2472 Enterprise St., Los Angeles, Cal.

TITANOX

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TITANOX

TRADE MARK

W-S FITTINGS

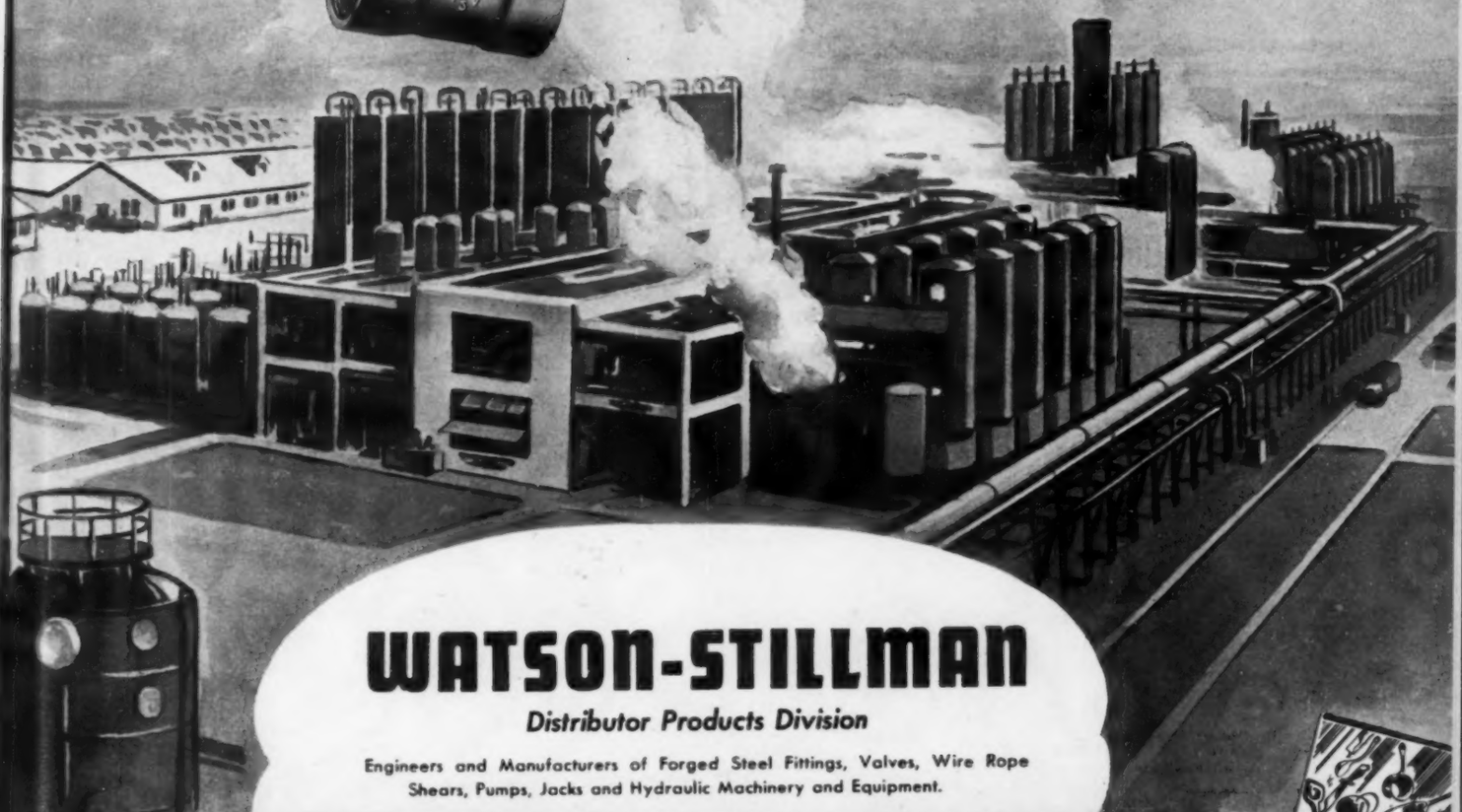
In the Rubber Program

In Government-sponsored plants for the manufacture of synthetic rubber, the intricate equipment required for conversion of liquids and gases into Butadiene called for highest quality pipe lines. Watson-Stillman Forged Steel Fittings, Valves and other pipe-line equipment are serving this intensive program to the complete satisfaction of contractors, engineers and official inspectors.

The W-S Two-Diamond emblem is the guarantee of quality, efficiency and workmanship.

The Watson-Stillman Co., Roselle, N. J.

The picture below is typical of a self-contained synthetic rubber plant in full operation. Such a plant cost about $56,000,000 and is scheduled to produce 90,000 tons of rubber a year. A half-billion dollars has been invested in these plants, which assures their continued operation after the war.



WATSON-STILLMAN

Distributor Products Division

Engineers and Manufacturers of Forged Steel Fittings, Valves, Wire Rope Shears, Pumps, Jacks and Hydraulic Machinery and Equipment.

For Victory ★★★ Let's all be Scrappers

4387

JAR RINGS ALSO SERVE

In the face of restrictions, greater demand and changing formulations, Pequanoc Rubber Company still aids the jar ring manufacturers in getting this essential product into the kitchens of America.

For many years we have supplied special Reclaims for jar rings and continue to meet present day problems of the industry.

PEQUANOC RUBBER CO.

QUALITY RECLAIMS FOR SPECIFIC PURPOSES

BUTLER NEW JERSEY

SALES REPRESENTATIVES

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2301 Lincoln Way West
Mishawaka, Indiana

Harold P. Fuller
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Burnett & Co. (London) Ltd.
189 Regent Street
London W. 1, England

AN IMPORTANT WAR TIME MESSAGE REGARDING

ELASTI-CALS

The Nameplate with COLOR and S-T-R-E-T-C-H

Meyercord's patented Elasti-Cal process — formerly used for colorful nameplates, trademarks and decorations on a wide variety of civilian rubber products and sundries — is still available . . . BUT FOR WAR PRODUCTION ONLY!

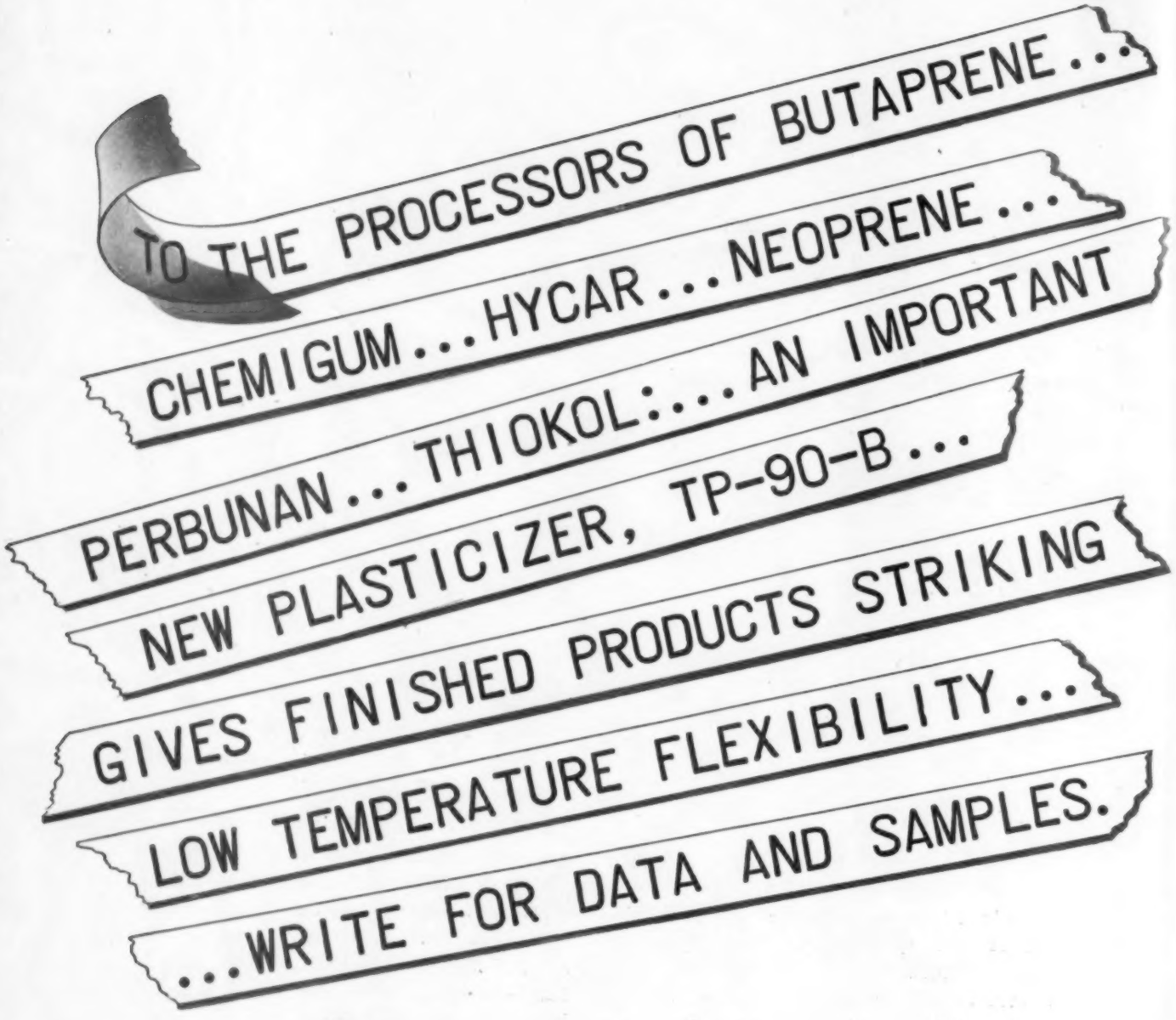
If you require color and high visibility for nameplates, operating instructions, serial numbering, etc.—if you require speed of application and "life of the product" durability—get the full story about Elasti-Cals. Speedily applied in the mold or by cold methods they stretch with . . . and become an edgeless part of the surface to which they are applied. Varying degrees of flexibility are available. Any color or design can be reproduced. Free designing and technical service is available. Reasonable deliveries can be made to duly authorized manufacturers of war products. Samples and complete details on request. Address Department 56-9.

Rubber manufacturers interested in Elasti-Cal's endless decorative possibilities for post-war products . . . who even now may be designing against war's end . . . are invited to avail themselves of Meyercord's technical service. Elasti-Cals—the nameplate with color and stretch will be available to ALL for greater post-war profits.

50th Anniversary 1893 1943 ELASTI-CALS SAVES RUBBER

THE MEYERCORD CO.

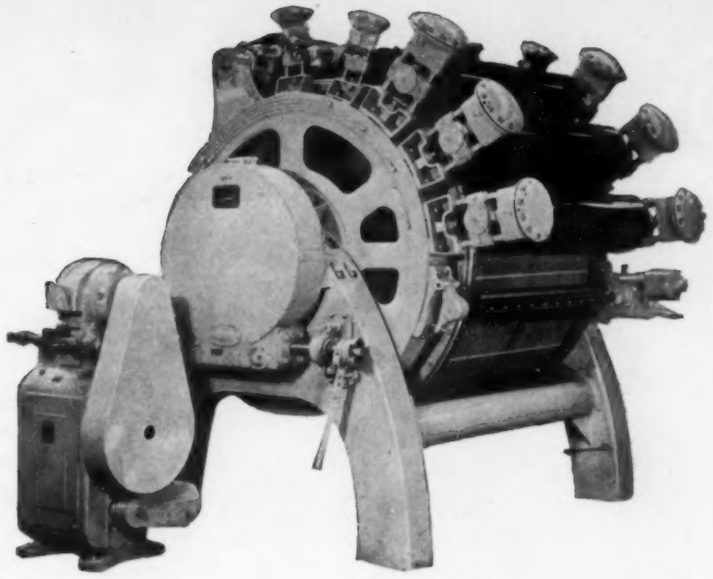
5323 WEST LAKE STREET • CHICAGO, ILLINOIS



TP-90-B

THIOKOL CORPORATION, TRENTON, N. J.

*Thiokol Corporation Trademark, Reg. U. S. Pat. Off.



This **Oliver Filter was designed and manufactured especially for the Synthetic Rubber Program. An operating unit is shown below.**

Special type

OLIVER FILTER

designed for the production of

SYNTHETIC RUBBER

Here's the result of a typical Oliver United pioneering job . . . the result of the company's long standing policy of investigating new fields and products in the interest of applying efficient dewatering and washing equipment to processing.

The Oliver Filter illustrated was not a standard unit for general application. While experiments indicated that vacuum filtration and washing would be desirable, even in our extensive line of filter types there was not just the right design. Consequently, we designed and developed another special unit based on a proved principle to give greatest flexibility combined with highest operating efficiency.

The performance of this Oliver Filter in the Synthetic Rubber Program has exceeded even the high estimates of capacity and washing efficiency that our experience indicated could be obtained.

●

Reclaiming Program . . . Increased requirements for reclaiming production have been met in several recent instances by repeat orders for Oliver Dewatering Filters. Our twenty years of service in manufacturing filters for reclaiming plants will be helpful to you.

New York 18, N. Y.
33 West 42nd Street

OLIVER UNITED FILTERS INC.

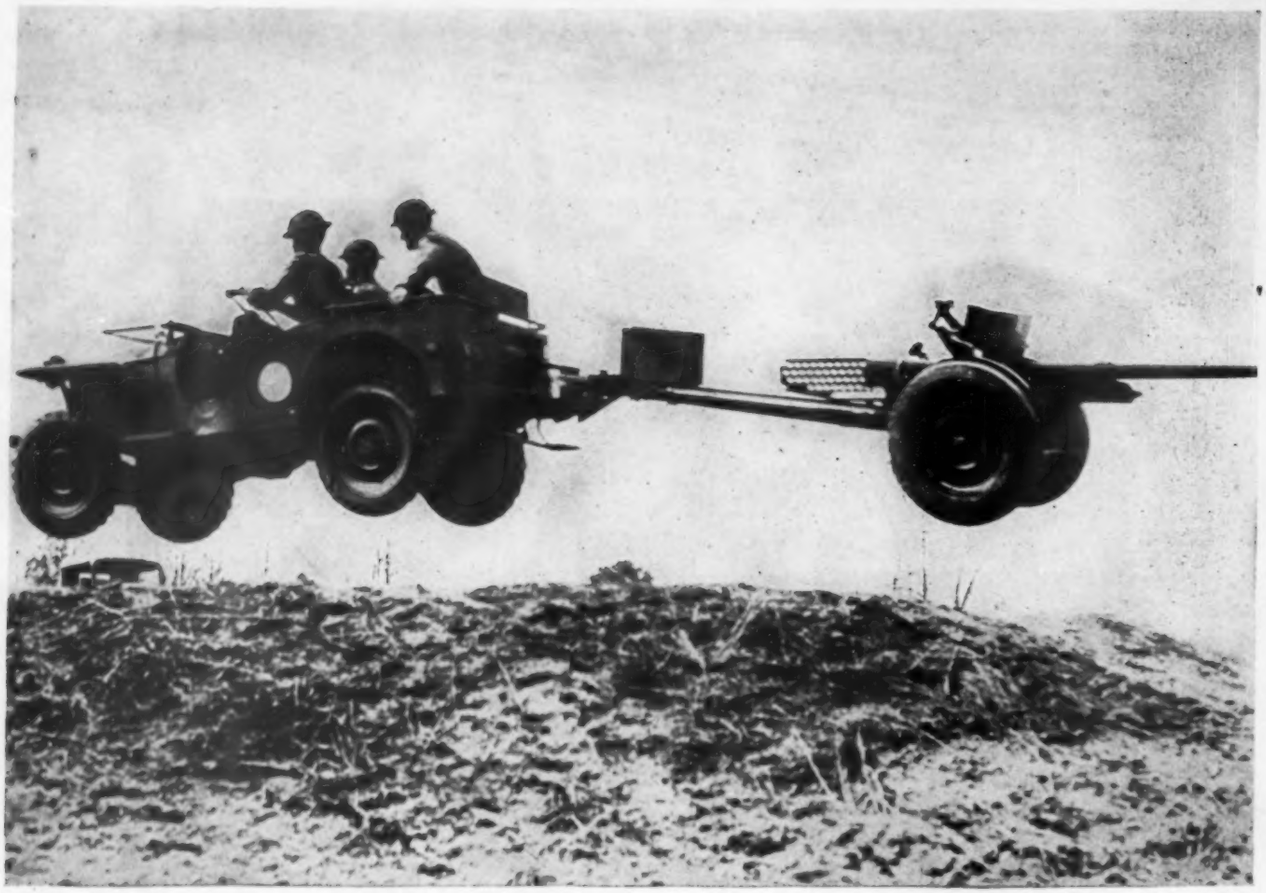
Chicago 1, Ill.
221 N. LaSalle Street

San Francisco 11
California

Western Sales Division
Oakland 1, Calif.
2900 Glascock Street

9-OUF-22

Factories: Oakland, Calif. — Hazleton, Pa. — Orillia, Ont., Canada — Melbourne, Australia



How to improve GR-S resilience

Manufacturers are incorporating Bardol,* a coal-tar chemical, in GR-S (Buna S), compounds to improve resilience and provide low hysteresis. Shown by tests to be compatible with GR-S, Bardol acts as a wetting agent and effective plasticizer. It processes readily and promotes dispersion of sulphur and accelerators in the elastomer, improving performance of the compounds.

Bardol may also be used effectively to improve:

- **Resistance to abrasion.**
- **Tensile strength and elongation.**
- **Flexibility at low temperatures and resistance to ply separation.**
- **Low permanent and compression set.**

For complete details, wire or write

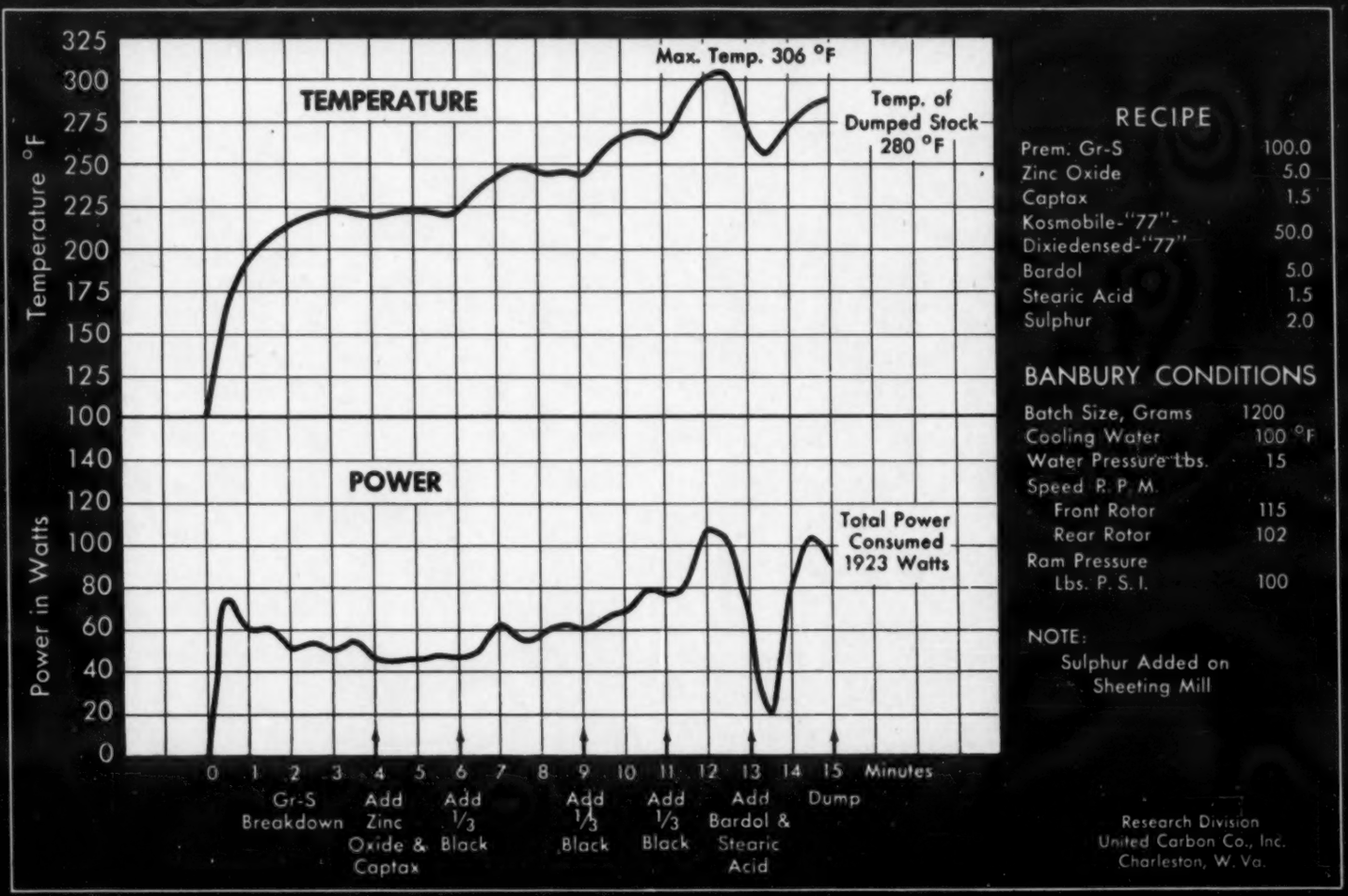
THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 RECTOR STREET, NEW YORK

Barrett

ONE OF AMERICA'S GREAT BASIC BUSINESSES

*Reg. U. S. Pat. Off.

BEHAVIOR OF UNITED BLACKS IN GR-S (BUNA-S) TREAD STOCK IN A BANBURY WITH KOSMOBILE 77–DIXIEDENSED 77



RECIPE

Prem. Gr-S	100.0
Zinc Oxide	5.0
Captax	1.5
Kosmobile-"77"-Dixiedensed-"77"	50.0
Bardol	5.0
Stearic Acid	1.5
Sulphur	2.0

BANBURY CONDITIONS

Batch Size, Grams	1200
Cooling Water	100 °F
Water Pressure Lbs.	15
Speed R. P. M.	
Front Rotor	115
Rear Rotor	102
Ram Pressure Lbs. P. S. I.	100

NOTE:
Sulphur Added on Sheeting Mill

Research Division
United Carbon Co., Inc.
Charleston, W. Va.

This graph speaks for itself. The moderate temperature rise and relative low power consumption, observed in this graph, would be even more pronounced where natural rubber is used with Kosmobile 77-Dixiedensed 77.

UNITED CARBON COMPANY, INC.

Charleston, West Virginia

New York • Akron • Chicago

USE UNITED BLACKS FOR BEST RESULTS

Kosmobile 77-Dixiedensed 77 is the dustless easy processing channel black (EPC) for natural and synthetic rubber. Take advantage of its relatively low power consumption and cool mixing, easy and smooth processing, fast curing, top reinforcement, high rebound, low heat build-up, and dependable performance under all sorts of demands.

Kosmobile 77-Dixiedensed 77 is *the* black for tires. Employ it where your cardinal specifications call for toughness, hardness, and resistance to deterioration by generated heat, abrasion, flexing, and cracking.

Kosmobile 77-Dixiedensed 77 is produced under exacting conditions and carefully controlled for quality and uniformity. To repeat, "Use United blacks for best results."

UNITED CARBON COMPANY, INC.

Charleston, West Virginia

New York • Akron • Chicago

Presses

Presses for rubber working and plastic molding, etc., are made by EEMCO in all sizes. EEMCO, successors to Nagle, builds machinery to meet today's production requirements in the rubber industry and for plastic molding.

Manufacturers of:

MILLS - REFINERS - TUBERS - EXTRUDERS
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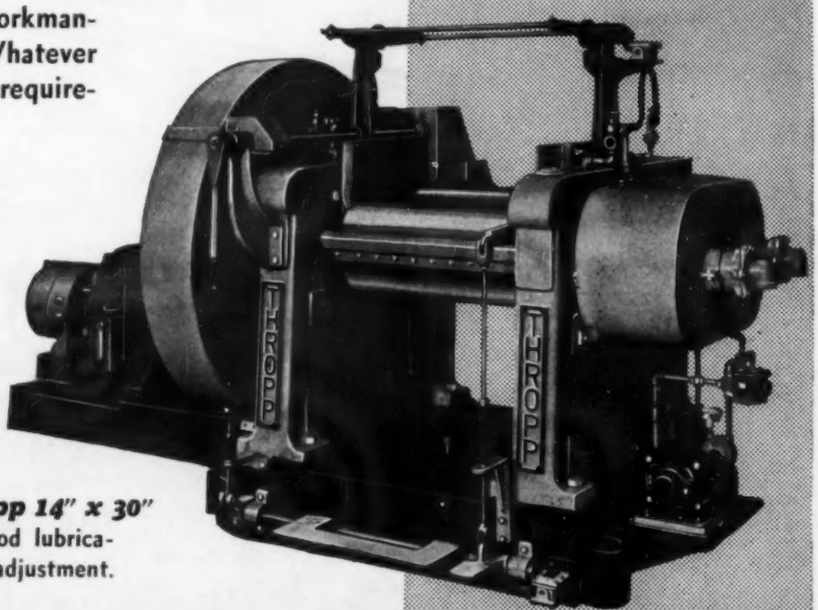

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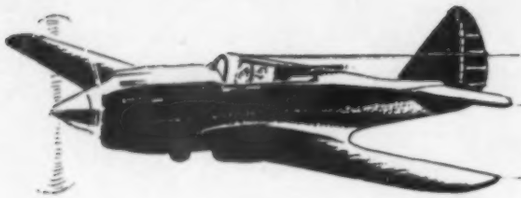

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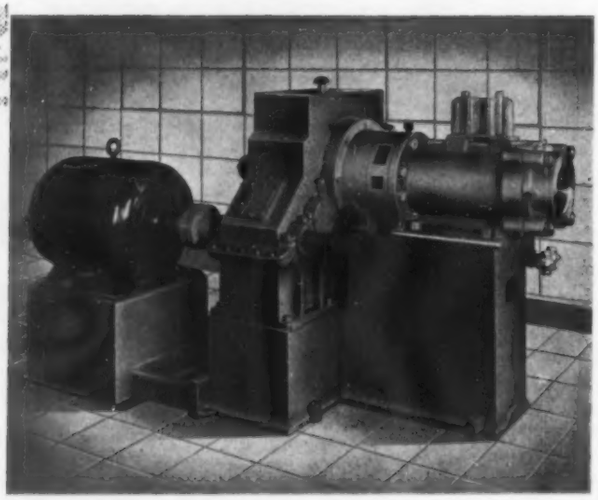

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The RUBBER AGE

VOL. 53, No. 6 SEPTEMBER, 1943

Protective Engineering for Military Installations of Delicate Equipment

By PAUL C. ROCHE

Field Engineer, Lord Manufacturing Co., Erie, Penna.

IN THE YEARS of experience that some of us have put behind us as engineers we mean to have worked toward one goal—to better our way of life. Whereas that ultimate goal has not been displaced, a situation now prevails necessitating a temporary detour from our regular course, and the order of the day is to short-circuit normal practices in an effort to survive with those symbols of past accomplishments which represent advancement in the state of our American civilization. Frenzied enemy greed has changed the complexion of our day-to-day problems and, in a word, it may be said that violence now plays a conspicuous role in every phase of our work—violence of offense or of defense.

The characteristics of modern war are such that, despite the existence of destructive influences, sensitive apparatus plays a part in all important military operations and proper protection must be provided to insure its accurate functioning. The prolongation of the life of such equipment under the punishment of constantly aggravating disturbances first entails provision of reasonable firmness in the equipment itself. An entirely separate and distinct, but not less important, approach to the same problem lies in the adaptation of effective cushioning mountings for the equipment; a variety of materials are available for this application and the proper design or selection represents a rapidly advancing science. The current outlook on this subject of protective mountings is the topic for this article.

Fundamentally, protective mountings applied to military or industrial equipment fall within either of two categories: (1) Those used to isolate, from the supporting structure and surroundings, disturbances originating within the mounted equipment, and (2) those used to support delicate equipment, protecting it from disturbances existing in the supporting structure. Typical of the first case are rubber suspensions used between the engine and plane structure on modern military and commercial aircraft. Illustrative of the second case would be an instrument panel, radio, or bomb-sight resiliently mounted within that same airplane. Since the first case has been quite comprehensively treated in recent technical papers, the opportunity is taken in this present writing to concentrate on the second case. It so happens that quantitative analysis follows the same fundamentals in case (2) as in case (1), though many of the factors that must be taken into account for adequate treatment are individual to each case.

The types of disturbance from which protection must be provided are commonly known as steady state vibration (referred to in the following discussion as simply "vibration") and shock. Vibration is recognized to be an oscillatory condition existing over an extended period of time, the characteristics of which are such that its amplitude plotted against time resembles a sine wave or can be shown to resemble several sine waves in combination. Common sources for this type of disturbance are main propulsion systems, auxiliary power plants, and rotating or reciprocating machinery, the vibration characteristics varying with speed of equipment operation and condition of loading for the most part.

A common source of such oscillatory vibration, in an Army tank lumbering along at steady speed, is the recurring contact of individual treads with the suspension "bogey" wheels and with the ground; wheel-driven vehicles may experience similar regular vibration from contact with seams in concrete pavement or the peaks of "washboard" terrain. Maneuvers of military craft and the common practice of operating over irregular ground can excite very aggravating shocks also. Moreover, impacts encountered in military craft can be of ballistic origin, evidenced upon discharging guns

Note: This article is based on a paper delivered by the author before the joint meeting of the Rubber & Plastics Group and the Aviation Division of the American Society of Mechanical Engineers, held in Los Angeles, California, on June 17, 1943.

mounted on the same equipment, or when that equipment becomes a target for enemy shells; torpedo hits and near misses, as well as mine explosions, are responsible for particularly violent shocks.

The isolation of forces which would destroy delicate equipment does not constitute the sole aim in adopting protective mountings, as it is common to come upon cases where the equipment is rugged enough to "take it," from the strength standpoint, but where sensitivity of operation has to be preserved; this is particularly true of relays, circuit breakers, and voltage regulators, the contacts of which have shown evidence of opening or closing at a disadvantageous time due to disturbing influences.

Every resiliently mounted system has its own natural period of vibration, determining the frequency at which it will oscillate before coming to rest when subjected to a single impulse. Whereas such oscillation at natural frequency for a very short period of time is characteristic of the effect of shock, excitation of that same system by a source of steady state vibration will cause oscillation of the mounted system at the rate of the impressed frequency.

As mentioned above, vibrations can be the result of vehicle operation over bumpy terrain, and, whereas the selection of most desirable mounts to isolate a predominant condition of vibration is often based on procedure entirely different than for shock protection, a logical question arises as to where the line is to be drawn between the two conditions of disturbance as frequency of impulses becomes lower and lower. The deciding factor in this matter is whether or not the mounted equipment comes fully to rest between successive impulses; if it does, the condition may be treated as shock; if not, vibration prevails.

A very significant consideration in all problems of protecting delicate equipment in military craft is the relative predominance of shock and of vibration as principal disturbing influences. Deliberately made to be as light as possible, consistent with strength requirements, an airplane spends the important part of its life off the ground and enveloped in air, a light fluid medium; accordingly, we concentrate on providing protection of its equipment with particular respect to vibratory forces transmitted through the structure from its high output main propulsion system, shock effects being of secondary importance.

An Army tank, on the other hand, is of very great structural rigidity and is subject to a variety of impacts which could readily damage its equipment without incapacitating the vehicle proper; together with this requirement of shock protection is an equally important problem of isolating the tank equipment from vibrations originating in the main power plant and in the tracks, which latter condition is becoming increasingly serious with the use of steel instead of rubber treads. Large naval vessels represent another extreme, in that adequate shock protection must be provided relative to ballistic hits and explosive "near-misses," while vibrations from its heavy, slow speed propulsion system are substantially less serious from a destructive standpoint.

Concentrating for the moment on vibrations typical of those treated as the problem in aircraft instrument panel protection, it is to be recognized that these may be of a translational or rotational character. The resiliently mounted system itself has six degrees of freedom, and by this statement we mean that motion of a greater or less amplitude is possible in that many directions, three of which are of a translational form in separate planes, while the other three are of a rotational nature about three separate axes. When the word "freedom" is used in this sense it should be remembered that it is merely relative and accordingly that movement might be brought about with less effort in one direction than in another, depending upon the characteristics of individual installations. Moreover, the fact that a degree of freedom exists in a given direction does not by any means imply that forces or moments actually prevail to cause movement of that character.

If a body were free floating in space it is readily understandable that the magnitude of vibratory force reaching it from any outside source would be nil. Of course it is impossible to realize this ideal condition with a body mounted to a structure but, by attaching through soft mountings, it is possible to reduce transmitted vibratory effects very considerably. Naturally a resilient mounting will sustain a steady deflection due to the weight of the equipment supported; then, as vibratory impulses from the structure are brought to bear, an oscillating motion occurs on both sides of this statically deflected position.

The effect of such vibration is to accelerate the mounted equipment in the instantaneous direction of the impulse, with the comparatively soft resilient mountings developing restoring effort as a state of strain is set up. But, before the distance through which the body has moved becomes very great, the vibratory effort will have changed its direction; accordingly the only part of the disturbing effort transmitted to the mounted equipment is that involved in deflecting the resilient mountings a distance corresponding to the maximum relative movement between that system and the structure.

It would be folly to attempt an analysis of vibration control without first recognizing the types and frequencies of vibration impressed upon the particular system under consideration. Having mentioned that adequate protection of instruments in aircraft installations requires an extreme of care, this will be treated as a specific case. Lacking 100% accurate balance of rotating parts, the engine may be expected to excite translational vibrations at one times crankshaft RPM (*i. e.*, "first order") in all directions in a vertical plane perpendicular to the crankshaft axis. Also predominant will be a rotational trembling of the engine about the crankshaft axis as the individual combustion impulses tend to rock the engine intermittently in a direction opposite to crankshaft rotation; occurring once every other revolution for each cylinder of a four-cycle engine, this would correspond to 4½ order, or 4½ times crankshaft RPM, for a 9 cylinder engine.

Analysis of the firing cycle will reveal a component occurring at crankshaft speed, which accounts for a first order rotational vibration effect. Any misfiring cylinder in such an engine will create a power irregularity every other revolution, in which case a half order rotational vibration would be apparent. These several modes and frequencies of disturbance are known to occur simultaneously and continuously.

With commonly encountered aircraft engines the idling speeds may occasionally be as low as 400 RPM and on up to 800 RPM. Cruising and top speeds cover the range 1,200 to 3,000 RPM; in all cases the operating speeds for liquid-cooled engines extend into the higher part of the speed ranges. In terms of these RPM values and the awareness of the orders of disturbing vibration indicated above, it is to be recognized that excitation

may be encountered at from 400 to 800 cycles per minute and from 1,200 c. p. m. on up, unless the half order occurs due to misfiring, which will add a new low to the range. However, in that the translational vibrations are inertia effects whose forces vary with the square of the speed and in that the rotational vibrations are not of great magnitude when the engine isn't delivering power to the propeller, it has not been found to be necessary to give great concern to vibrations at frequencies corresponding to low idling speeds.

So much for impressed frequencies of vibration. An expression for the natural frequency of a resilient mounting system is:

$$F_n = \frac{188}{\sqrt{D}} \qquad (I)$$

where D = static deflection (inches) existing in the mountings under the equipment weight supported, and F_n = natural frequency of the system (cycles per minute) in vertical translation. This formula can be applied to compute horizontal translational natural frequency as well by substituting in it an "apparent" deflection which is to be visualized as the amount the rubber would deflect if actually supporting the same equipment weight on a unit of stiffness corresponding to that prevailing in the horizontal direction.

The relationship between this natural frequency of vibration and the frequency of disturbing vibration from the engine is expressed:

$$T = \frac{1}{\left(\frac{\text{disturbing frequency}}{\text{natural frequency}}\right)^2 - 1} \qquad (II)$$

where T is the transmissibility factor or that portion of the vibratory amplitude that is conducted through the resilient mountings to the supported equipment. It should be noted that solutions of T of less than, equal to, or greater than unity may result, but only when it yields a decimal value does vibration reduction occur. Fig. 1 is based on a comprehensive group of solutions to this formula in which the degree of vibration reduction may be observed by taking into account: (a) Frequency of disturbing vibrations from the engine, and (b) static deflection in the mountings under the equipment weight supported. This clearly illustrates that, by an intelligent choice of static deflection rating in line with the disturbing frequencies encountered, the possible degree of vibration isolation is tremendous.

It may also be seen that, under certain poor combinations of conditions, the presence of the mountings may fail to reduce vibration transmission, and may even aggravate or increase it; this latter case is known as "resonance" or "sympathetic vibration," and when this occurs the natural frequency of the mounted system responds in step with the disturbing frequency of vibration from the engine, theoretically causing the amplitude of vibratory motion to become infinite. Particular care should be taken to insure that resonant speeds, of which every resiliently mounted system has one for each degree of freedom, occur only when excited at an engine RPM below the operating range. If this is not 100% practical, it should at least be made to occur at a very low idling speed or a speed known to be transient, not a speed at which the engine may operate continuously, such as take-off RPM, cruising RPM, or top speed.

Fig. 2 is a picture showing one of six identical mounting points on the instrument panel of a current model two-engine Army bomber, providing a convenient opportunity for the application of the chart shown as Fig. 1. This illustrates vividly the effectiveness of an arrangement known as a "double mounting," by virtue of which, upon using one mounting over the other in series with it, double deflection results. In this representative instance 1/16 in. static deflection per mounting gives ⅛ in. deflection per double mounting. With a disturbing frequency of 2,400 cycles per minute, corresponding to top speed, we find from the chart that about 95% vibration isolation will result, so it is not surprising that the movement of the panel is imperceptible to the camera, despite the fact that the vibration in the supporting structure is of sufficient amplitude to show a blurred effect in that part of the picture.

It may also be deduced from the chart that vibrations at 1,200 RPM cruising would be reduced by 75%. Considering an idling condition at 600 RPM the obser-

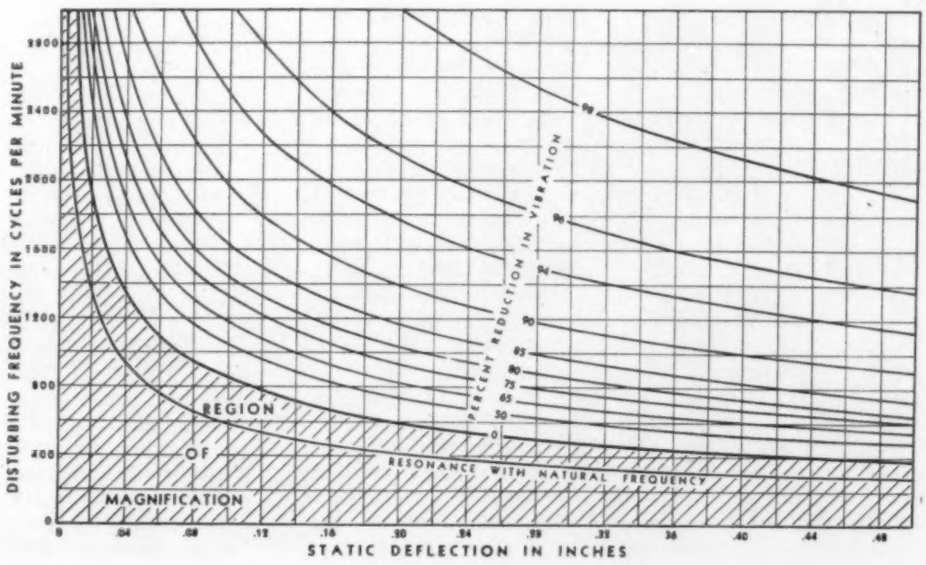


FIG. 1—Mounting efficiency in terms of disturbing frequency and static deflection.

FIG. 2—Aircraft instrument panel using two mountings in series for double deflection. Note amplitude of structural movement which is isolated from the panel.

vation to be made is that, while no reduction has been accomplished with respect to any low amplitude vibrations existing in this range, at the same time a resonant condition has been successfully avoided. Double mounting installations like that shown constitute a standard practice in the protection of instrument panels and other delicate apparatus in aircraft; a particularly desirable characteristic of this arrangement is that it can be so installed as to exhibit substantially equal stiffnesses with respect to horizontal and to vertical translation by virtue of which the resonant frequency band is held to a minimum and isolation is insured for all three translational modes.

Perhaps the question has arisen as to whether, say, vertical translational movement of a resiliently mounted body can be excited only by a vertical translational vibration from the source or, by the same token, if rotational motion can occur only as the result of rotational disturbance. Such would be the case if the mounted body were attached to the structure supporting that source in such a manner that its points of attachment were in a plane with its center of gravity. It has been observed, however, that delicate equipment to be mounted for aircraft service is actually so remote from the source of disturbance that the individual types of vibration tend to lose their identities, or become "coupled," as a result of which they do not reach the resiliently supported apparatus in their initial forms, translational disturbances predominating. Accordingly, it is necessary to assume that any degree of freedom of the mounted equipment can be excited by any mode of vibration from the source.

It is possible to compute the performance characteristics of a resiliently mounted system (even to applying a correction for unsymmetrical mounting location) before making actual installation and to check such calculations by attaching the system to a test stand and subjecting it to a variable speed source of vibration. After sufficient tests have been made, changing the position of attachment of the mounted equipment from one test to the next, the natural frequencies of that system in each of its various degrees of freedom may be observed, and, if these are not compatible with the frequencies to be experienced in actual service, the resilient mountings should be altered to suit.

Fig. 3 is a picture of such a test wherein the resonant frequency of a rubber mounted body is in evidence. Oscillation of the table in this test device is imparted by a connecting rod driven by a rotating shaft through an adjustable double eccentric, providing means of varying amplitude as well as frequency of vibration. This is known as a "positive displacement" exciter and contrasts with an unbalanced type of shake table, in that the latter contains merely a motor driving a deliberately unbalanced flywheel to shake the table as it rotates, in which design the magnitude of vibratory effect builds up as the square of the speed of rotation.

A reasonable "double amplitude" of oscillation for such a test would be 1/64 in., comparing with .005 to .030 in. known to be conducted through aircraft structures; 1/32 in. amplitudes have been observed in airplanes in certain extreme cases, resulting in damage to structure as well as accessory equipment. Experience has shown that one can be certain of the ability of the most sensitive apparatus to stand up in aircraft service when its double amplitude of vibration does not exceed .004 in.

It is time now to treat further the subject of shock, close destructive ally of steady state vibration. Let us picture a structure which undergoes a sudden jolt or acceleration in response to an impact of external origin. As this occurs, the inclination on the part of a body resiliently mounted to that structure is to continue in a state of rest. If the mounting were so soft as to exercise no restraint whatever, and if sufficient clearance existed between that body and the structure, a large relative displacement could result and no part of the shock would be felt by the mounted equipment. By definition, however, a resilient medium will build up a restoring force under strain, as a result of which it inevitably experiences a degree of motion. With certain reservations, then, and proper consideration of all factors entering in, it may be stated that, for outstanding shock protection, mountings should be chosen to be as soft as possible; this is consistent with the knowledge that the only force, and consequent acceleration, transmitted to the mounted equipment is that developed in the mountings as they deflect an amount equal to the relative displacement between the supported body and the structure.

Before choosing an anti-shock mounting for minimum stiffness, however, it is necessary to provide proper static deflection to satisfy all conditions of steady state vibration that may exist at the same time. Moreover it is important to take care that undue instability of the mounted equipment relative to the supporting structure will not result, having allowed clearance to the extent of the intended unrestricted relative travel. It is a fact that in the selection of mountings to protect against shock, as well as in the control of regular vibration, extreme deflection beyond a reasonable degree fails to justify itself with appreciable additional protection.

The Tank-Automotive Center (Division of Army Ordnance Department), in cooperation with certain of its contractors, has carried on a large amount of shock test work. In the course of their projects, shells have been fired at production models of tanks and at turrets, each containing delicate equipment mounted on representative contrasting types of cushions. The shells used correspond to the most severe types that are thrust against our tanks in warfare and provision was made to insure that projectiles would not penetrate but would spend 100% of their kinetic energy at the

impacted structure. In most instances duplicate readings were taken of displacements, frequencies, and amplitudes of movements in the tank armor and various other elements. After each round a careful visual check was made to record damage occurring. Some very pertinent observations have been recorded and all parties concerned feel very aware of the necessity of giving attention to shock conditions as a fundamental requirement in the mechanical development of military equipment.

Test records reveal that under impact the armor is subjected to very high frequency motion of small amplitude, together with relatively low frequency motion of large amplitude. It is evident that the frequencies apparent are natural frequencies and harmonics of the tank structural sections which have been excited by the impact just as a tuning fork can be set to motion; please recognize, however, that resonance does not exist, since the excitation is not continuous but practically instantaneous. While the high frequency components are responsible for terrific accelerations that develop very great destructive forces in rigidly mounted apparatus, and thus create the principal need for protective mountings, the large amplitudes of the low frequency components are cause for concern since they may result in exceeding the safe deflection limits of the flexible elements.

Fig. 4 shows diagrammatically the composition of the vibration excited, wherein "B" and "C" are the high and low frequency components which jointly constitute that shown as "A." Considering either "B" or "C" individually: "x_o" expresses the maximum displacement (feet), whereas "x" is the displacement after any time "T" (seconds); "ω" is the angular velocity of the motion (equal to cycles per second x 2π, giving radians per second). Such a sinusoidal relationship is analyzed according to expressions for simple harmonic motion as:

$$\text{(displacement)} \quad x = x_o \sin \omega T \qquad \text{(III)}$$

$$\text{(velocity)} \quad \frac{dx}{dT} = x_o \omega \cos \omega T \qquad \text{(IV)}$$

$$\text{(acceleration)} \quad \frac{d^2x}{dT^2} = -x_o \omega^2 \sin \omega T \qquad \text{(V)}$$

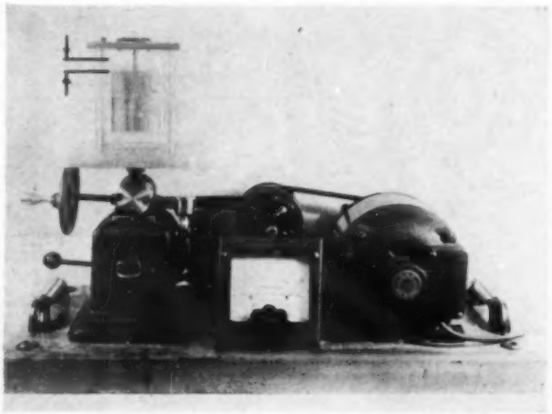


FIG. 3—This positive displacement exciter is set to operate at the natural frequency of the rubber-mounted body under test. Arrows indicate the double amplitude of the resonant vibration.

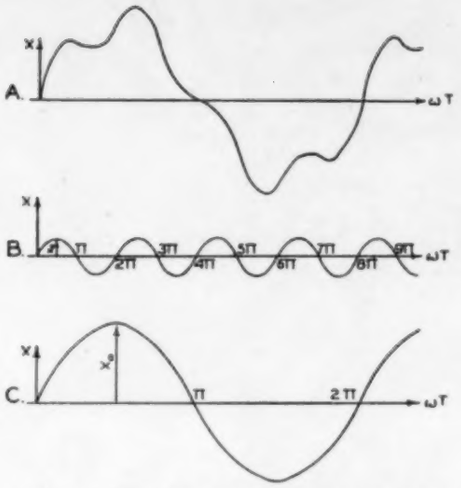


FIG. 4 (X indicates direction of positive displacement and ωT indicates time axis) —Combination wave A represents high frequency wave B superimposed on lower frequency wave C, each having its own maximum single amplitude of movement x_0.

Since acceleration is expressive of the destructive force that prevails, we are principally concerned with that quantity. Substitution in equation (V) indicates that this reaches a maximum value equal to $-x_o \omega^2$. Solutions of this expression are commonly divided by 32.2 ft./sec.^{2}, enabling reference to accelerations as some multiple times "g," *i. e.*, times acceleration of gravity. High values of acceleration, as great as several thousand "g," may exist in the structure, but these are not of great significance when considering forces affecting resiliently mounted equipment. It must be recognized that no acceleration anywhere near the peak figures prevail over a sufficiently long time interval to permit that amount of relative motion to occur which would develop correspondingly high restoring forces in the flexible elements; actually the structure will have changed its direction of motion before very great relative motion can take place.

In terms of formula (II) the ratio between disturbing frequency (from the structure) and natural frequency (of the resilient mounting system) is sufficiently high to give a low transmissibility factor, when considering the high frequency components, while some higher, though not necessarily unreasonable, solution will result when substituting the lower frequency components of structural vibration; the benefits of a resiliently mounted installation over a rigid system in the presence of these influences is obvious.

Typical of the higher frequency oscillations just mentioned was that set up in the hull of a light tank during ballistic impact testing, when a 9,000 cycle per second disturbance was recorded under the fire of a gun similar to that used as the principal weapon on American light tanks. Accelerations caused by terrain shocks and gun recoil do not exceed 4g, usually falling in the range of 2½ to 3½g. In a case where definite information is available as to the degree of acceleration that a piece of equipment can withstand without damage or faulty operation (which we believe should be at least 10g if

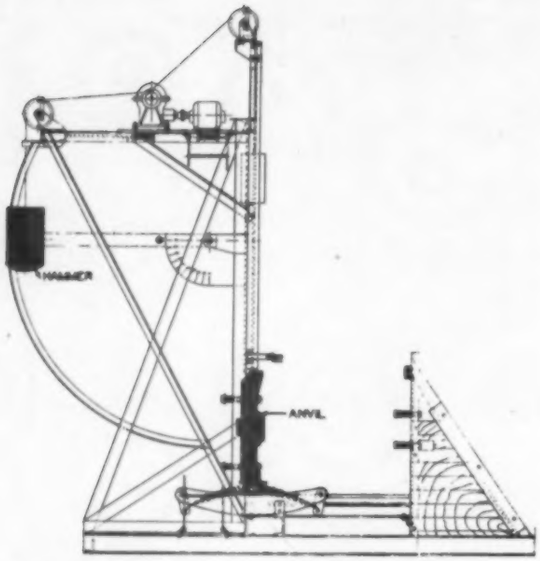


FIG. 5—2000-foot pound impact test used by U. S. Navy. The hammer is dropped on the anvil, to which equipment under shock test is attached.

ballistic impact is likely to be encountered), and where records indicate the magnitude of vibratory forces impressed on that body by the structure, there is wisdom in adopting mountings of such stiffness that the force transmitted to the mounted system is just safely incapable of causing damage or unsatisfactory operation. Such a choice would be made in an instance where unnecessary softness had to be avoided for reasons of stability, etc. In arriving at such a compromise it should be borne in mind, however, that resonance produces much more severe accelerations at high frequency than at low frequency, should any possibility of resonance exist.

It has been agreed, on the basis of these tests on tanks, that instruments are incapable of measuring, and it is impossible to picture with any hope of accuracy, what happens at the point of ballistic impact or within a radius of at least a foot. To go a step further with this thought, it is known that the impact intensity of transmitted shock is reduced upon travelling through the armor, which is the basis of a recommendation to avoid attachment of equipment at positions on the tank that may be exposed to direct shocks by mines, bombs, or shell fire; the tank structure has an inherent capacity for shock isolation, of which advantage should be taken. By the same token, a greater benefit can be the result of mounting equipment on a comparatively flexible component of the tank such as the turret basket. When it is impractical to avoid the mounting of equipment to the hull there is said to be an advantage incident to the use of brackets allowing a degree of permanent deformation under close-by impacts, which yielding permits relative motion without increasing the force being transmitted; no part of the mounted equipment should be closer than 1 in. to the hull, since displacements of this magnitude can and have occurred under ballistic impact.

One other point to be passed along in particular connection with tank installations is a reference to frequencies of steady state vibration; those emanating from the main power plant occur at substantially the same rate as disturbances in aircraft flight engines, while excitation from the tracks is from 1,200 to 6,000 cycles per minute, depending on the speed of the vehicle; on the basis of these figures, 1/16 in. static deflection has been used for most rubber-mounted delicate equipment in tanks and with favorable results.

The technicians of the United States Navy, particularly the Bureaus of Ships and Ordnance, have much experience behind them along the lines of shock research; their laboratories are well equipped for this work and they have at the same time consulted with industry in their anxiety to learn as much of the answer as possible. A much used Navy shock test is known as the 2,000 ft. lbs. impact, in which a 400 lb. weight falls 5 feet and strikes an anvil to which the equipment under observation is attached; a diagram of this test equipment is shown as Fig. 5. Even less gentle is a ballistic impact test in which the equipment is attached to the back of a heavy section of armor plate and 8 in. shells are fired at it—yes, it has been found possible to use shear loaded rubber mountings to protect apparatus from the impacts of 8 in. shells striking close-by.

Even as in the other services, however, the Navy's problems are unique. To compete favorably in a technical type of warfare involves the adaptation of a very large amount of specialized apparatus. With installation space at a premium, due to very limited clearance in many ship locations. the Navy is constantly confronted with a problem entailing restriction of the overall travel of certain anti-shock mounted equipment. Consistent with a plan of providing protection from the most aggravating shock components encountered in Naval vessels without permitiing unreasonable equipment travel, it is becoming common practice to select rubber mountings for static deflections of .010 in. or less, corresponding to resonance at a frequency above that impressed by the main propulsion system of the ship, which seldom exceeds 1,600 c. p. m. In going over shock studies carried on by both of our principal military services it is pertinent to note that the fundamental analyses of the Navy and their conclusions regarding the composition of shock are in agreement with those separately arrived at by the Army.

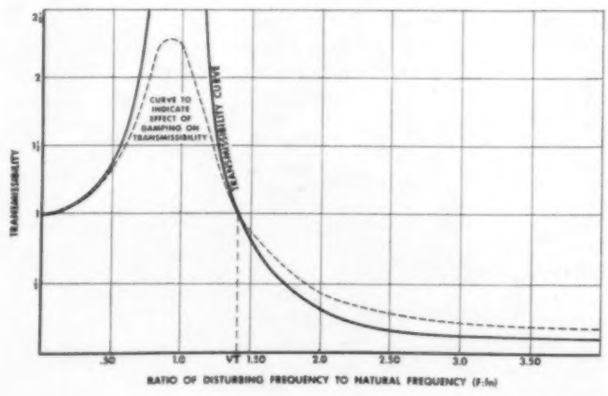

TRANSMISSIBILITY
CURVE TO INDICATE EFFECT OF DAMPING ON TRANSMISSIBILITY
RATIO OF DISTURBING FREQUENCY TO NATURAL FREQUENCY (F/fn)

FIG. 6—Relation between transmissibility factor and frequency ratio. Damping increases transmitted vibration in normal range of application, reduces it in amplification zone.

Two methods of reducing vibration transmission are those referred to as "isolation" and "absorption," and the difference between the two expedients is clear cut. "Isolation" implies the employment of resilient cushions which store vibrational energy during one part of a cycle and release it during a later phase; all of the above treatment has been based on this principle. On the other hand a mounting is said to "absorb" vibration when it receives kinetic energy during all parts of the vibratory cycle yet releases none mechanically, converting it all to heat. Very often both these means are incorporated in the same system to accomplish vibration reduction jointly, as a shock absorber supplementing the spring of a vehicle. Absorption is described as having a "damping effect" on a vibrating system and is capable of reducing the motion of the mounted system when the action of resilient elements would increase it, as in the case of resonance, transient effects, or rebound; at the same time, whenever the resilient mountings reduce the vibration, the damping effect detracts from the effectiveness of such reduction. A mild degree of vibration absorbing capacity exists in rubber, on the order of 4% of that which would be required to eliminate the vibration in one-half a vibratory cycle, *i. e.*, 4% of "critical damping."

Fig. 6 shows the influence of damping on transmissibility; note that its effect is favorable at frequency ratios of less than 1.414, where more pronounced vibration magnification would otherwise take place, and unfavorable above that value, where more effective vibration reduction would otherwise result. The limited absorptive capacity in rubber is akin to fluid friction, the effect of which increases with the velocity of excitation, exercising negligible frictional restraint at the beginning of motion. Contrasting characteristics are exhibited by mechanical or dry friction which requires substantial effort to initiate motion and less effort to sustain it; the usefulnes of this characteristic in an anti-shock or anti-vibration mounting is limited, since pronounced jolts are set up in overcoming the high initial friction and then that restraint decreases with further motion where it could be of greater benefit.

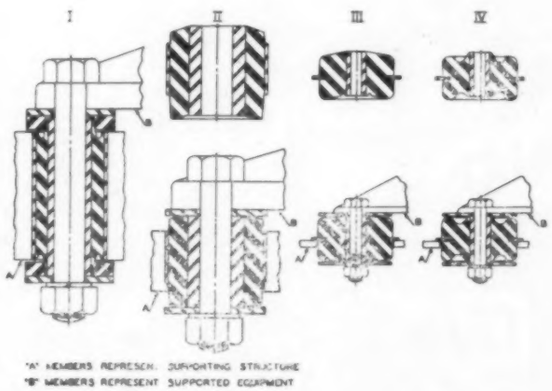


FIG. 7—Snubbing Type Mountings: (I) Conventional tube form mounting with separate snubbers; (II) Tube form vertical snubbing (V.S.) mounting—upper without load, lower under normal load; (III) Sloping shoulder type plate form V.S. mounting under no-load and normal load; (IV) High shoulder plate form V.S. mounting under no-load and normal load.

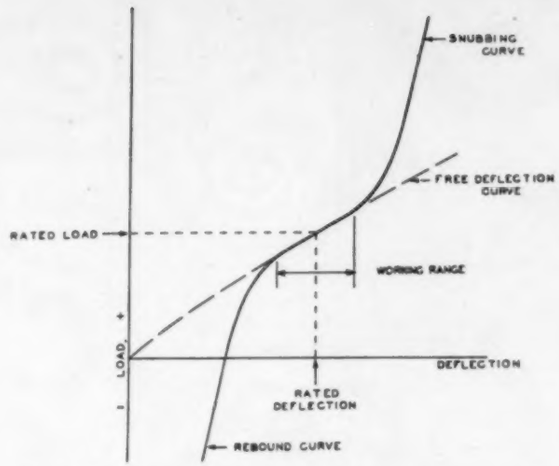


FIG. 8—Typical load-deflection curve for vertical snubbing type mounting.

The addition of absorption to a resilient support can, under certain circumstances, prove to be of benefit, but attention should always be directed to insure that all advantage has been taken of mounting stiffness best suited to existing conditions before increasing the damping effect.

Frictional damping is not the only means employed in controlling large displacements due to impacts or resonant vibration in a sprung system. Another device in common use is that known as a "snubber," which has been built into mountings integrally and in which case it is referred to as a "vertical snubbing" design. It became a justifiable matter of habit, in the course of working up mounting designs during peace time, to adapt a vertical snubbing mounting for, say, a power plant in an automotive vehicle and to conclude that shock control had been provided; actually this is an entirely different case from those discussed in this paper since the purpose in such non-military installations is to limit overall movement upon encountering road shocks with the sole aim of preserving alignment between driving and driven equipment, and between power plant and frame. Reduction of forces due to such impacts was not demanded of the engine mounts because chassis springs, operating at far greater static deflection, performed this function effectively.

Various commercial forms of snubbing type mountings are shown on Fig. 7, all of which are proportioned to provide a small amount of travel for accomplishing vibration isolation within a predetermined working range and to limit overall movement beyond that range. Fig. 8 is a typical load-deflection curve for this type of mounting and it is to be realized that such a unit usually appears in a shape that is offset toward one end when not supporting load, in order that the application of its intended static load will bring it into symmetry with equal clearances adjacent to restricting surfaces at both "load" and "rebound" ends. Because the stiffness of the mounting is so much greater outside the working range, it is imperative that a snubbing type mount be selected only on the basis of accurate knowledge of weight supported; an improper selection will almost inevitably result in poor isolation characteristics.

In a resilient mounting installation without such snubbing provided by stiffness that increases with travel

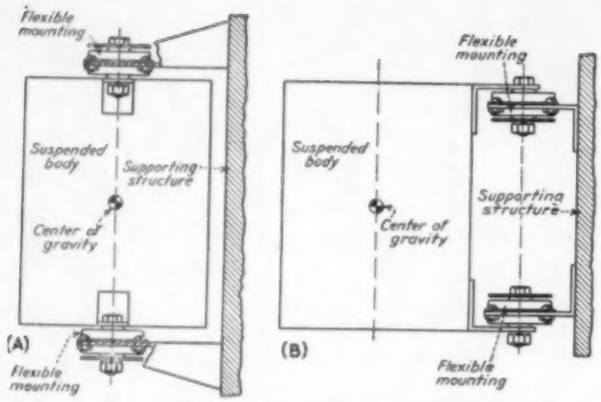


FIG. 9—(A) Center-of-gravity support, illustrating recommended mounting practice; (B) Non-center-of-gravity support for same equipment.

beyond a normal range, a large displacement can result in metal-to-metal contact of bracket members. Accordingly, it is usually desirable to set limits to travel, either early or late in the stroke, employing a stiff, though far from rigid, medium. An opinion shared by many persons experienced in this line indicates that the recommended travel in either direction before undergoing snubbing action should be 7 to 10 times the single amplitude of the most destructive high frequency component of disturbance; at the same time this clearance should be at least equal to the amplitude of the lower frequency component.

If it is found to be entirely impractical to provide an assembly according to this plan, because of space limitations (it is to be borne in mind that the safe travel for a rubber mounting is proportional to the rubber dimension being deflected), probably the worst alternative would be to incorporate snubbing at some shorter degree of travel; such an arbitrary choice has been known to result in the magnification of vibratory forces due to the effect of blocking the movement of the system when its velocity is high. We feel that a decidedly better compromise than this is to incorporate far earlier snubbing action (which does not stiffen up sharply at any stage of deflection), in order to check the movement before high velocity can develop.

In approaching a conclusion of fundamental references on this subject, there are a number of practical points that can be mentioned which have been found to be of advantage. Particularly important is the advisability of locating mountings in either a horizontal or a vertical plane with the center of gravity of the supported equipment; in Fig. 9, sketches "A" and "B" illustrate the "do" and "don't", respectively, for installation of a given piece of equipment. The advantages of a "center of gravity suspension" are: (a) It substantially prevents different modes of vibration from becoming coupled, (b) the individual natural frequencies can be made to fall within a reasonably narrow range, and (c) for a given stiffness of mountings this arrangement yields the greatest possible stability.

There is no question that rubber mounting engineers would be in a position to extend greater service in devising outstandingly protected equipment installations if the attitude "Here's a piece of apparatus; how will we mount it?" were superseded by: "We are laying out a new device. What provision shall we make for rubber mountings." Nevertheless, in the necessary haste of our present problems, we are often compelled to do the best we can with what exists now. This fact has often been the reason for locating the points of resilient support at the base of a tall piece of equipment as in "A" of Fig. 10; the stability of this assembly, with center of gravity high above the mounting plane, would be greatly improved by the addition of stabilizing mountings at the top as indicated in "B".

Sometimes an individual delicate element in an apparatus requires a greater degree of protection than can be provided within the overall limitations of a resiliently mounted installation. This might be true of a particular radio tube in a set mounted at the cabinet base. An arrangement that has been applied to provide the required protection in such instances is the separate mounting of that single element as a unit. Having done this, one is not to expect this secondary mounting system to exhibit a natural frequency that can be anticipated solely in terms of its own static deflection, since the resilient supports at the base will also have a bearing on the combined natural frequency. Before freezing such a design, it is recommended that the complete apparatus be subjected to shake table tests and that all mounting selections be fixed on the basis of the observations made.

The aim behind this article has been to record certain information by way of spreading it to those who can use it to help win this war. The sources of this information are many and it is our sincere hope that useful references may be extracted by others. If there is one particular point we have aimed to put across, it is the absolute necessity of basing the specifications of protective mountings on prevalent conditions; casual selection can be disastrous and the practice of installing something similar to a rubber heel, with the hope that it will be better than nothing, is to be avoided.

ACKNOWLEDGMENTS

To the Tank-Automotive Center of the United States Army Ordnance Department, to the Bureaus of Ships and Ordnance of the United States Navy, to the contractors of these organizations, and to Messrs. Wallerstein and Yates of the Lord Manufacturing Company, acknowledgment and thanks are gratefully rendered for contributing to the contents of this article.

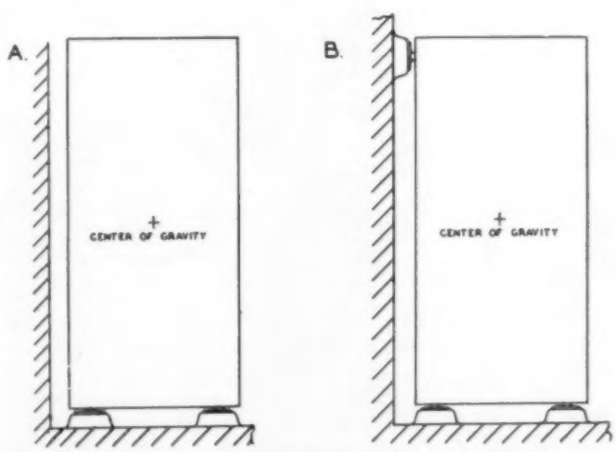


FIG. 10—(A) Undesirable and (B) desirable method of mounting tall equipment, providing stability.

Division of Rubber Chemistry to Meet in New York City on October 5, 6, 7

THE Fall Meeting of the Division of Rubber Chemistry, A.C.S., will be held in New York City on Tuesday, Wednesday and Thursday, October 5, 6 and 7. Headquarters will be at the Hotel Commodore and all technical sessions and other events will take place in that hotel. The Division had previously decided not to meet with the parent Society in Pittsburgh because of lack of suitable accommodations in that city.

The meeting of the Division will feature 30 technical papers. In addition, the usual banquet will be held on Wednesday evening, also at the Commodore, and a business meeting will be held on Thursday afternoon. New officers for the 1943-44 season, based on the letter ballot, will be announced during this meeting.

All of the technical sessions, which will largely feature papers treating with synthetic rubber problems, will be held in the Main Ballroom of the Commodore, as will the banquet. Parlor A has been reserved for committee meetings, while two additional parlors are available for meetings and luncheons of various professional groups. A number of pre-banquet parties will be held by various suppliers.

An experienced clerical force will be on hand to handle all registrations. The registration desk will open early on Tuesday morning, October 5, and all those attending the meeting will be required to register and secure lapel identification. Registration fee is $1.00 for members of the A.C.S. and $2.00 for all others. Banquet tickets, at $4.00 each, will be on sale at the registration desk only on Tuesday, October 5, and none will be sold after 6:00 P.M. on that day.

For the convenience of those who wish to register and/or purchase banquet tickets in advance, a special coupon is provided on Page 547 of this issue. It is not necessary to send advance cash covering the registration fee, but checks for banquet tickets should be made payable and sent to Charles R. Haynes, Binney & Smith Co., 41 East 42nd Street, New York City.

The Committee in charge of local arrangements for the meeting of the Division is headed by E. B. Curtis (R. T. Vanderbilt) as chairman, assisted by Walter Geldard (Naugatuck Chemical), Charles R. Haynes (Binney & Smith), John H. Ingmanson (Bell Telephone Labs.), Harry E. Outcault (St. Joseph Lead), B. B. Wilson *(India Rubber World)*, and Peter P. Pinto (RUBBER AGE).

Abstracts of the scheduled papers, together with their authors and company connections, follow herewith:

Program of the
DIVISION OF RUBBER CHEMISTRY
AMERICAN CHEMICAL SOCIETY
Hotel Commodore—New York City
October 5, 6 and 7

Tuesday Morning—October 5
11:00 A.M.—Technical Session.

Tuesday Afternoon—October 5
2:00 P.M.—Technical Session.

Wednesday Morning—October 6
9:30 A.M.—Technical Session.

Wednesday Afternoon—October 6
No Papers Scheduled.

Wednesday Evening—October 6
6:30 P.M.—Division Banquet, Main Ballroom, Hotel Commodore.

Thursday Morning—October 7
10:00 A.M.—Technical Session.

Thursday Afternoon—October 7
2:00 P.M.—Technical Session.
3:10 P.M.—Business Meeting.

ABSTRACTS OF PAPERS

Tuesday Morning—October 5

11:00 A.M.—Introductory Remarks. ***John T. Blake, Division Chairman (Simplex Wire & Cable Co., Cambridge, Mass.).***

11:10 A.M.—Behavior of Carbon Blacks in Various Rubbers in a Banbury. ***I. Drogin, F. W. Dillingham, and H. W. Grote (United Carbon Co., Charleston, W. Va.).***

This study covers thirteen types of blacks. The distinction that exists among these in physical and chemical characteristics and reinforcement is also evidenced from their behavior in the Banbury.

Detailed observations were made on these blacks as to power consumption and temperature rise in a Banbury "B" when mixed in five different types of synthetic rubbers and in smoked sheet. Observations were also made on the behavior of easy processing channel black and semi-reinforcing furnace black when mixed in GR-S (Buna S) at different Banbury speeds and with the circulating water at different temperatures. Addition time of the softener and variation of the black loadings were also studied.

Blacks of larger surface, high volatility, and acid pH consume more power and generate more heat than blacks of smaller surface, low volatility, and alkaline pH. Thus in GR-S, a black having four times as large a surface as another black, higher volatility, and an acid pH will consume twenty-five per cent more power and generate 100° F. higher temperature.

The rubber is also an influencing factor. It takes a third less power to mix channel black in GR-I (Butyl) than in B-N (Buna N) and approximately ten per cent less power to mix the same black in smoked sheet than in GR-S. The same black registers 20° F. higher in GR-S than in smoked sheet. In B-N it is 40° F. higher.

For the same mixing cycle, faster Banbury speeds lead to more power consumption, higher temperatures, and improved extrusion. Less power is consumed when the circulating water is warmer.

The study includes complete rubber test data.

11:40 A.M.—Plastication and Processing of GR-S. ***G. R. Vila (Naugatuck Chemical Division of United States Rubber Co., Naugatuck, Conn.).***

In research work on polymers it is often assumed that, in general, the viscosity or plasticity of the mixed compound is a direct measure of its processing characteristics. It was observed, however, that compounds formulated from GR-S which had been treated in a Gordon plasticator invariably tubed faster and smoother than similar compounds made from cold milled polymer although the compounded viscosity of the former frequently was higher. Inasmuch as these observations were at variance with laboratory predictions it was decided to investigate the fundamental nature of plasticity and its relation to processing.

The results obtained indicate that viscosity measurements bear a direct relationship to the power required in tubing but do not correlate with tubing rates. The latter in turn depend upon worm speed and the surface condition of the mixed compound, smoother surfaces tending to give faster speeds regardless of viscosity. The degree of swell of the tubed member upon exuding from the die is also found to bear a direct relationship to relative surface smoothness. It is possible, therefore, to predict tubing characteristics with a reasonable degree of accuracy from a knowledge of the plasticity or viscosity of the finished compound in conjunction with an estimate of its relative surface smoothness.

Surface smoothness may be achieved by hot breakdown, increasing softener ratios, or increasing pigment ratios. Thus the faster tubing rate and smoother appearance resulting from Gordon plastication is explained by the high temperatures developed during breakdown. High temperature plastication, however, is found to exert a deleterious effect on the physical properties of the subsequent vulcanizate.

The data are not sufficiently extensive to draw valid conclusions with reference to correlation between benzene solubility of the raw polymer and processing characteristics. There is evidence, however, that higher benzene solubility may result in a more favorable processing history. Cold milling was found to increase benzene solubility, presumably rupturing the gel structure formed during polymerization. Hot milling or Gordon plastication, however, reduced benzene solubility. Further investigation is required to determine if this latter effect is due to the formation of a gel structure or if it represents a depolymerization resulting in benzene insoluble end products.

12:05 P.M.—The Processability of GR-S and Its Improvement by Chemical Means. ***Bernard M. Sturgis and John R. Vincent (Jackson Laboratory, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.).***

A study of the processability of GR-S has led to the conclusion that there is no correlation between the plasticity of a GR-S sample, as measured by several common types of plastometers, and its behavior on a mill. One reason for the difference in behavior during mastication between GR-S and rubber may be the fact that oxygen plays a much smaller part in the breakdown of GR-S than it does with rubber. Since plasticity measurements cannot readily be used in the development of processing agents for GR-S, a new type of test was developed. This is a millability test in which the time necessary to form a smooth band on a 70° C. laboratory mill is measured.

A new class of processing agents for GR-S has been developed. These compounds function by decreasing the breakdown time of GR-S, decreasing the time necessary for the incorporation of compounding ingredients, and improving the processability of the compounded stock. These agents are effective when used in quite small amounts, 0.5 to 4 per cent on the elastomer, and therefore appear to be true chemical processing aids rather than physical softeners or lubricants.

Tuesday Afternoon—October 5

2:00 P.M.—Theory of the Thermoelastic Phenomena for Rubber. ***Eugene Guth (University of Notre Dame) and Hubert M. James (Purdue University, now on leave of absence at the Radiation Laboratory, M.I.T., Cambridge, Mass.).***

There are three thermoelastic phenomena for rubber and rubberlike materials: (1) They change their temperature on fast stretching; (2) If stretched by a constant load (isotonic stretch) they contract visibly when heated; (3) The stress in rubber kept at constant extension (isometric stretch) increases with rising temperature. The change in temperature on fast stretching is negative (cooling) for low extensions. It passes through a minimum, becomes zero (adiabatic thermoelastic inversion point) and finally positive (heating) for increasing extensions. Rubber stretched isotonically is anistropic in its thermal behavior. It possesses a negative linear thermal expansion coefficient in the direction of the stress and a positive one perpendicular to the direction of the stress.

Both for isotonic and isometric stretch there exists a thermoelastic inversion point at a critical extension which is about half of the value of the critical extension for the adiabatic thermoelastic inversion point. The theory of the authors explains these phenomena quantitatively. The visible contraction of isotonically stretched rubber when heated is due to the fact that the linear thermal expansion coefficient of stretched rubber is negative and of the magnitude of the (cubic) thermal expansion coefficient for gas. The thermoelastic inversion points are determined in a simple manner by the cubic thermal expansion coefficient of unstretched rubber.

2:20 P.M.—Mechanism of Branching During Polymerization Reactions. ***G. Goldfinger, W. Zybert and H. Mark (Polytechnic Institute of Brooklyn, Brooklyn, N. Y.).***

Osmotic pressure and viscosity studies of dilute solutions of certain synthetic high polymers indicate properties which can be explained by partial branching. It may therefore be interesting to consider the conditions under which high polymers, generally polymerizing in straight chains, undergo branching.

Two specific cases shall be discussed: In one, the free valence on the polymer-chain, which is required for the branching to occur, is created by splitting off a hydrogen atom or a substituent. The growing chain may either be attached to the polymer and there form a branch, and the H-atom (or substituent) acts as a radical to start a new chain, or the hydrogen might saturate the growing chain, and the free valence created on the other chain forms the origin for a side chain to grow.

In the other case, a double bond in the chain is opened by collision with a growing chain and the origin of further growth is created while a branch is formed.

It is possible to show that the rate of polymerization, especially in the later stages of these reactions, might be measurably influenced by branching.

2:45 P.M.—Unsaturation of Polyisobutylenes and Butyl Rubber. Reactions with Nitrosobenzene, Thiocyanogen, Iodine Monochloride, and Ozone. ***John Rehner, Jr. (Esso Laboratories, Chemical Division, Standard Oil Development Co., Elizabeth, N. J.).***

The reactions of polyisobutylenes and of isobutylene-isoprene copolymers with nitrosobenzene, thiocyanogen, iodine monochloride, and ozone were studied with the purpose of determining the low degrees of unsaturation possessed by these polymers. Unsaturation values based on the use of nitrosobenzene appear to be high because the addition reaction is accompanied by oxidation phenomena, while those with thiocyanogen are complicated by apparently incomplete reaction and by the simultaneous formation of polymerized thiocyanogen. The iodine monochloride reactions generally lead to high values through the occurrence of substitution reactions. When ozonized air is passed through a solution of the polymer in carbon tetrachloride, the intrinsic viscosity rapidly decreases to a minimum value that is characteristic of the mean size of the polymer fragments existing originally between successive double bonds. Unsaturation values based on the limiting viscosities of the degraded polymers appear to be reliable and are in reasonably good agreement with values determined by analysis of the end groups of the products. The ozone degradation method is quite sensitive and has the advantage

of being applicable to polymers possessing unsaturation values too low to be measured readily by other more conventional methods.

3:10 P.M.—Organic Structure of Linear Polyesters and Their Rubber-Like Properties. ***C. S. Fuller and B. S. Biggs (Bell Telephone Laboratories, Murray Hill, N. J.).***

Most high molecular substances have properties somewhat reminiscent of natural rubber when suitable swelling agents are present or if the examination is made within a favorable temperature interval. In terms of recent theory the structural requirements for a compound to exhibit more or less reversible stress strain behavior are few. We need only to secure organic molecules of sufficient length and flexibility which are so constituted as to remain or become amorphous in the temperature range in question and to provide intermolecular ties or cross-links at proper intervals.

The present paper is an attempt to relate the structure of linear high polymers to their rubber-like properties. Inasmuch as the linear polyesters provide a series of definite compounds which are easily prepared and in which the composition can be readily varied, these have been selected as model polymers for investigation.

By employing mixtures of ethylene and propylene glycols, polyesters are prepared with pure succinic and sebacic acids and mixtures of the two. Phthalic acid is employed in some cases to illustrate the effects of high polarity. All of the polyesters produce rubber-like substances on vulcanization by heating in the presence of benzoyl peroxide. Both gum and loaded vulcanizates are prepared and their properties studied. Partially unsaturated polyesters in which a small part of the saturated dibasic acid is replaced by maleic acid are also investigated as gum and as loaded vulcanized compositions. These compounds require much less peroxide to reach the same state of cure than do the saturated compounds.

The polyesters can be mixed in the usual manner on mixing rolls, but because of their relatively low viscosities they must be handled on as cold a mill as possible. Good dispersions of iron oxide and calcium carbonate are easily obtained and these fillers, in a finely divided state, provide excellent reenforcement. Ultimate tensile strengths of 3000 p.s.i. have been obtained in the case of the saturated polyesters. Alkaline pigments such as ZnO and MgO must be avoided since they cause hydrolysis of the esters and loss of rubber-like properties. Carbon blacks also are not satisfactory because they react with the peroxide curing agents and prevent proper cure.

Stress-strain and brittle temperature data have been obtained on a large number of polymers chosen so as to illustrate the effect of chain structure on these properties. It is shown, as would be expected, that increase in molecular weight leads to higher ultimate tensile strength, other things being equal. However, most of the results are reported on polymers having comparable average chain lengths in order to eliminate this variable.

The results show that the orderliness of the arrangement of the units making up the chain molecules and the concentration of polar groups per unit of chain molecule length have a profound effect on properties. Regular structures, other things being equal, lead to vulcanizates having the greatest ultimate tensile in loaded stocks. Even in gum vulcanizates, which in most cases are weak, regularity of structure has a pronounced effect in improving tensiles.

The brittle temperatures and oil resistance of the vulcanizates vary with the concentration of polar groups present and are not dependent on regularity of the chain structure.

Finally, evidence obtained in this work indicates that the vulcanization process occurring in the case of the polyesters is a random cross-linking of units of neighboring chain molecules. The similarity to the vulcanization process for natural rubber tends to substantiate the cross-linking theory of vulcanization in which primary valence linkages are produced between chain molecules.

3:40 P.M.—Linear Polymer Gums: Compounding and Properties of the Vulcanizates. ***John K. Sumner and Robert J. Myers (Resinous Products & Chemical Co., Philadelphia, Penna.).***

The linear polymer gums are new types of synthetic vulcanizable elastomers. The vulcanizates resemble those of natural rubber in many respects, and are indistinguishable from them on superficial examination, but differ from them in certain important properties.

The gums themselves are essentially polyesters carried to a high molecular weight, made from dibasic acids and dihydric alcohols, either with or without an additional small percentage of an unsaturated component. They vary in physical state from very viscous semi-solid plastic masses to hard brown materials resembling gutta percha. They can be compounded in the usual way, and vulcanized by means of benzoyl peroxide or, if the amount of unsaturation in them is increased, by means of sulfur and accelerators in the conventional manner.

The unvulcanized compounded stocks can be milled, extruded, calendered, cured, and otherwise processed with but slight modification of conventional rubber technique. Their building tack is excellent. Curing times are very short, and their curing curves are very flat.

The vulcanizates have tensiles of 1600 to 1800 p.s.i. and elongations of 300 to 600% when the stocks are compounded on a 12″ mill and cured for 10 min. at 20 lbs. steam pressure in a 6″ x 6″ ASTM slab mold.

The gums can be synthesized to give "tailor-made" products having specific desirable properties. These vulcanizates can be made to have outstanding resilience, electrical properties, heat stability, oil and solvent resistance, or low temperature flexibility, depending on the composition of the gum. Several of these properties can sometimes be built into one gum.

The properties of the vulcanizates of the linear polymer gums presage many interesting developments in the field of synthetic elastomers. Specialized application requirements which are consistent with current availability of the raw materials needed can be met by appropriate adjustments in the composition of the gums.

4:05 P.M.—Measurements of the Decomposition of Peroxides in the Presence of Carbon Black. ***G. Goldfinger and R. P. Rossman (Godfrey L. Cabot, Inc., Boston, Mass.).***

The rate of decomposition of benzoyl peroxide and a number of inorganic peroxides and persulphates was studied. The reactions were carried out in benzene, xylene and water in the presence and absence of carbon black.

Cuthbertson *(Can. J. Research,* Vol. 20B, pp. 103-113, 1942), Goldfinger and Rossman (Pittsburgh Meeting, A.C.S., Sept. 6-10, 1943) and others have studied the mechanism of decomposition of benzoyl peroxide in benzene and xylene solution. The authors' measurements were carried out in the presence of carbon black. Cuthbertson proposed a mechanism for the homogeneous decomposition and Goldfinger and Rossman one for the surface decomposition of this peroxide. From this latter investigation it appeared that during the decomposition in the presence of carbon black a surface poison was formed, which ultimately inhibited the reaction. It was possible to slow down the reaction by adequate pretreatment of the carbon. Thus far, however, it has not been possible to inhibit completely the surface decomposition.

This study has now been extended to urea peroxide, ammonium persulphate and potassium persulphate in water solutions. These are relatively stable compounds. The carbon black shows a similar accelerating effect on the decomposition of these compounds as on benzoyl peroxide, but the reaction is considerably slower. Up to now, no evidence of surface poisoning has been found.

4:25 P.M.—The Effects of Blending Some Natural Rubbers with GR-S. ***Ross E. Morris, Arthur E. Barrett, Richard E. Harmon (Rubber Laboratory, Navy Yard, Mare Island, Calif.), and Theodore A. Werkenthin (Bureau of Ships, Washington, D.C.).***

The effects of blending some natural rubbers with GR-S in tire carcass stocks have been investigated. The natural rubbers were Hevea, Mexican resiniferous guayule, Mexican

deresinated guayule, domestic resiniferous guayule, domestic deresinated guayule, chilte, goldenrod and Cryptostegia. The blend ratio was 20 per cent natural rubber, 80 per cent GR-S. Two basic recipes, containing 2 parts of sulfur and 3 parts of sulfur respectively, were used.

It was found that Hevea, Cryptostegia, domestic deresinated guayule, and Mexican deresinated guayule, in order of preference, were the best rubbers of those investigated for blending with GR-S. All of the blends were tackier than the corresponding 100 per cent GR-S stocks and, when compounded with 3 parts of sulfur, the vulcanized blends excelled the 100 per cent GR-S vulcanizates in the following respects: ultimate elongation at best cure and overcure when tested at 82° F. and at 200° F., tear resistance when tested at 82° F. and 200° F., tensile strength when tested at 200° F. The vulcanized blends were about equal to the 100 per cent GR-S stocks in the following respects: mechanical efficiency, ultimate elongation after oven aging, tensile strength when tested at 82° F.

Wednesday Morning—October 6

9:30 A.M.—Solubility and Diffusion of Sulfur in Synthetic Elastomers. ***A. R. Kemp, F. S. Malm and B. Stiratelli (Bell Telephone Laboratories, Murray Hill, N. J.).***

The rate of solution of sulfur in various elastomers during milling has been shown to depend on several factors the most important of which are temperature, fineness of sulfur and its solubility. The solubility and rate of diffusion of sulfur in various synthetic elastomers has been determined using procedures employed in a previous investigation carried out in these laboratories. The results show that sulfur is more soluble in GR-S than in crepe rubber above 55° C. and less soluble below this temperature. The solubility of sulfur in Perbunan, Hycar OR-15 and Butyl B-3 is less than rubber or GR-S in the order given at all temperatures. The rate of diffusion of sulfur through elastomers decreases in going from crepe rubber to Buna-S, Hycar OR-15 and Butyl B-3 in the order given.

9:55 A.M.—Heats of Vulcanization of Synthetic Rubbers. ***P. L. Bruce, R. Lyle and J. T. Blake (Simplex Wire & Cable Co., Cambridge, Mass.).***

The heat effect during a chemical reaction frequently assists in the understanding of its mechanism. Previous studies on the heat of vulcanization of natural rubber have been extended to the Buna S, Buna N, Neoprene, and Butyl rubber types of elastomers. The shape of the curve relating heat evolved to the amount of sulfur present is similar for natural rubber, Buna S, and Buna N. The amounts of heat evolved are of the same order of magnitude. A small percentage of carbon black produces a definite decrease in the heat evolved. Larger quantities of carbon black show little additional effect.

Butyl rubber vulcanizes in the presence of sulfur with only a very slight evolution of heat. p-quinone dioxime vulcanization involves considerable heat evolution, but this is due to side reactions and not the vulcanization itself.

10:20 A.M.—Temperature Coefficient of Vulcanization of Buna S. ***La Verne E. Cheyney (Goodyear Tire & Rubber Co., Akron, Ohio), and Robert W. Duncan (Firestone Tire & Rubber Co., Akron, Ohio).***

Temperature coefficients have been determined for three Buna S stocks accelerated with dibenzothiazyl disulfide, over the temperature range 270° to 300° F. The stocks investigated included a pure gum control stock, a tread type stock reinforced with a channel process carbon black, and a mechanical goods type stock containing a fine thermal black.

Two independent methods were employed to determine temperature coefficients—physical properties and combined sulfur data. The average values obtained from physical data were 1.95 for a temperature change of 10° C. and 1.45 for a change of 10° F. The corresponding values obtained from the combined sulfur data were 2.06 and 1.49, respectively.

Practically constant values of temperature coefficient were obtained in the presence or absence of reinforcing pigment and over a five-fold variation in sulfur content. The differences between the values obtained from physical and chemical data are within the limits of experimental error and are therefore not regarded as significant.

10:40 A.M.—A Method for the Rapid Determination of Rate of Cure of Natural and Synthetic Rubber. ***L. H. Cohan and M. Steinberg (Continental Carbon Co., Chicago, Ill.).***

The accurate evaluation of rate of cure of rubber compounds has long been a source of difficulty. The optimum tensile cure has had the most wide-spread use as a measure of rate of cure of natural rubber stocks. The uncertainties encountered with this method are well known for natural rubber and are even greater for GR-S compounds which exhibit very flat maxima for the tensile strength-cure time curve. The failure of the T-50 and cold set methods for state of cure of GR-S increases the need for some criteria of cure rate in this polymer and simpler methods are always desirable for natural rubber.

In this paper some semi-quantitative methods for evaluation of rate of cure from the tensile strength-cure time curve are presented. The methods which are based principally upon the ratio of the tensile strength at an undercure to optimum tensile are in good agreement with some of the established methods for determining rate of cure in both natural rubber and GR-S.

Data is presented comparing the proposed methods with some of the accepted criteria of rate of cure in both natural rubber and GR-S tread compounds containing a series of pigments ranging from a coarse rapid curing whiting to a very fine slow curing channel black. Combined sulfur, as a function of cure, is included for the GR-S stocks and is in good agreement with the suggested methods.

The simplicity and rapidity of the proposed methods enhance their application to plant control work. The methods have shown excellent agreement with T-50 tests on production channel blacks in a natural rubber control test formula.

11:05 A.M.—The Sulfur Linkage in Vulcanized Rubbers. ***M. L. Selker and A. R. Kemp (Bell Telephone Laboratories, Murray Hill, N. J.).***

I. The Reaction of Methyl Iodide with Sulfur Compounds: Methyl iodide reaction at room temperature can be used to differentiate between mercaptan, sulfide, and disulfide sulfur in anhydrous systems. Mercaptans react slowly giving hydrogen iodide. Sulfides react quantitatively in one to three days but the product depends on the type of residue on the sulfur atom. Disulfides react very slowly. In so doing, the sulfur to sulfur link is ruptured with liberation of free iodine.

Mercuric iodide catalyzes the sulfide and disulfide reactions making the former quantitative in one hour and the latter in three days.

Pale crepe rubber or GR-S do not interfere chemically with the reactions. The reactions are presented with a view to their use in the determination of the sulfur link in vulcanizates.

II. The Reaction of Methyl Iodide with Vulcanizates: The dispersion of vulcanized rubber in solvents which do not attack the sulfur bonds is dependent on the presence of oxygen.

The reaction of methyl iodide with vulcanizates at 24° C. leads to the removal of part of the combined sulfur as trimethyl sulfonium iodide. Evidence is presented that the sulfur so removed is sulfide sulfur linked to the α methylene carbon atom of the rubber polyisoprene chain.

In the case of well cured gum rubber stocks the less the quantity of methyl iodide-removable sulfur present, the higher the tensile strength. Upon overcure there occurs conversion of non-removable to removable sulfur while the sulfur which combined on overcure is completely removable.

Complete devulcanization can be achieved with methyl iodide at 100° C. The nature of the devulcanized product depends on reaction time and catalysts.

The sulfur linkages in a GR-S gum stock apparently do not differ chemically from those present in a pale crepe gum stock.

11:35 A.M.—The Heat Resistance of GR-S. ***B. M. Sturgis, A. A. Baum and J. R. Vincent (Jackson Laboratory, E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware).***

Investigation of the heat aging of GR-S vulcanizates has demonstrated that not only do different types of changes take place in GR-S than in rubber when vulcanizates of these elastomers are heated, but also the causes of these changes differ. GR-S vulcanizates undergo the same amount of hardening whether heated in the presence of air, or in the presence of carefully purified nitrogen. This fact indicates that oxidation plays little part in the heat aging of GR-S. After-vulcanization appears to play a smaller part in causing the changes brought about by heating vulcanized GR-S than it does in the heat deterioration of vulcanized rubber. The activity of the accelerator used, or even the presence of an accelerator, has little effect on the heat aging. Low sulfur vulcanizates are somewhat superior to those in which greater amounts of sulfur is used, but no outstanding improvement is thus obtained. From these observations it appears that most of the effects observed when GR-S vulcanizates are heat aged are due to an instability of the polymer or vulcanized polymer which allows further polymerization or cross-linking to take place.

The deterioration of GR-S vulcanizates by heat can be greatly reduced by the use of an entirely different method of vulcanization. Aromatic polynitro compounds, particularly dinitrobenzene, have been found to give good vulcanizates with GR-S whose stress-strain and tear properties are very similar to those of sulfur vulcanizates. The heat resistance of the dinitrobenzene vulcanizates is considerably superior, the retention of elongation after 4 days in a 100° C. air oven being from 65 to 70% compared with less than 50% for most sulfur vulcanizates. This heat resistance is apparent both in heavily loaded and lightly loaded GR-S stocks. Although the conventional methods used in rubber have failed to impart the desired heat resistance to GR-S vulcanizates, the use of dinitrobenzene as a vulcanizing agent has pointed a way toward the solution of this problem.

12:00 Noon—Butaprene NF: A New Cold Resistant Synthetic Rubber. ***R. H. Crossley and C. G. Cashion (Xylos Rubber Co., Akron, Ohio).***

Butaprene NF, a new oil-resisting synthetic rubber with excellent flexibility at low temperature, is discussed, and data are presented showing the effect of several compounding variables on certain of its properties. The effects of varying the stearic acid, zinc oxide, magnesium oxide, lead oxide, and sulfur concentrations; types and concentrations of accelerators, fillers and softeners; and time of cure are reported. Special emphasis is placed on the effect of these variations on cold resistance, but data are also included to illustrate their effect on tensile strength (before and after oven aging), compression set, resilience, and resistance to swelling in gasoline with high aromatic content. Typical compounds having superior resistance to low temperatures are reported.

Thursday Morning—October 7

10:00 A.M.—Compounding Study of Channel Black and M.R. in GR-S. ***H. F. Schwarz (Wishnick-Tumpeer, Inc., Chicago, Ill.).***

M. R. (mineral rubber) is one of the oldest and most extensively used compounding ingredients for natural rubber and reclaim, being used as a softener, dispersing agent, filler, or extender in a wide variety of products.

In GR-S, the use of M. R. has certain advantages in addition to those mentioned above. It imparts to a GR-S compound greater tensile strength, greater resistance to tear, and increased resistance to growth of cracks due to flexing. This paper presents data showing the effect of M. R. on these physical properties.

The data are presented by the method of "trilinear compounding" proposed by D. B. Forman (RUBBER AGE, Volume 50, Page 191). The effects on physical properties of variations in GR-S base compound, channel black, and M. R. within the following ranges are shown by this method:

	Percentage by Volume				
GR-S base	100.		65.		40.
Channel Black	0.	to	35.	to	20.
M. R.	0.		0.		40.

By examination of the graphs it is possible to select the proper amounts of channel black and M. R. to use to obtain the highest tensile strength, greatest resistance to tear, and the greatest resistance to flex crack growth. The modulus and hardness of each compound are also shown.

10:20 A.M.—Effect of Variable Sulfur Accelerator Levels on Properties of GR-S Tread Stocks. ***L. R. Sperberg (Phillips Petroleum Co., Bartlesville, Oklahoma).***

GR-S tread compounds containing 0.50, 0.75, 1.00, 1.25, 1.50, 2.00 and 4.00 parts of sulfur per hundred parts of GR-S each with low, normal and high acceleration of (1) Altax and (2) Santocure have been prepared using both Easy Processing Channel Black, and High Modulus Thermal Black. Nine properties (modulus, tensile, elongation, permanent set, hardness, flex-crack growth, resilience, heat build-up, and abrasion loss) and the effect of heat aging upon certain of these properties have been studied over a range of cures. The various sulfur levels are compared at optimum acceleration with respect to the different properties investigated.

10:45 A.M.—The Effect of Time and Temperature of Cure on the Properties of GR-S Tread Stocks. ***A. E. Juve and B. S. Garvey, Jr. (B. F Goodrich Co., Akron, Ohio).***

Part I—The properties of tread compounds with 1, 2, and 3 PHR of sulfur each with three ratios of Captax-DPG have been measured over a range of cures at 260° F., 280° F., and 300° F. The data indicate that: (1) The inflection point in the modulus-time curve is a good measure of comparative state of cure; (2) Equivalent cures at different temperatures (260° to 300° F.) give the same properties; (3) With the accelerator range used, these compounds were more sensitive to changes in the sulfur ratio than to changes in the accelerator ratio, and (4) A faster rate of cure than anticipated was observed in the thick specimens used for the hysteresis tests.

This latter observation was further checked by curing slabs in thicknesses from 1/16" to 2½" at varying times and measuring the properties at the center of the slab. The development of equivalent states of cure at various thicknesses is much faster than for natural rubber.

Part II—Cures and tests similar to those in Part I were run on a series of tread stocks accelerated with Monex and others cured with Tuads without added sulfur. The conclusions arrived at in Part I also apply to these compounds. In addition (1) the "flat curing" characteristics of Monex accelerated stocks is thought to be due to the more rapid rate of sulfur combination so that virtually all the available sulfur is combined at the optimum cure; (2) Tuads cured stocks show an advantage over Captax-DPG and Monex accelerated sulfur stocks in resistance to crack growth at higher levels of hysteresis; (3) aging tests run on this series indicate that the rate of deterioration as judged by increase in modulus and decrease in elongation is doubled by a rise in the aging temperature of 18° F.

11:15 A.M.—Tread Cracking of Natural and Synthetic Rubber Stocks. ***Irven B. Prettyman (Firestone Tire & Rubber Co., Akron, Ohio).***

A laboratory tread cracking machine employing a grooved test piece and providing, in the flexing cycle, tension (21.5, 30.0, 44.5, 64.5 or 93.0 per cent), compression (43 per cent) and bending in the base of the groove is described. The similarity in flexing action between the machine and tires in service is discussed. Test samples may be cured in a special mold or obtained from the tread of a cured tire. Either tests of crack initiation (normal samples) or crack growth (precut samples) may be conducted. The relative merits of measuring the

amount of cracking in a given flexing time and measuring the time necessary to crack a given amount are given.

A series of groove cracking tests is presented of blends of Hevea-GR-S, Guayule-GR-S, Reclaim-GR-S, and Hevea-reclaim in tread stocks. The Hevea-reclaim stocks are shown to decrease in flexing life with increase in reclaim for both crack initiation and crack growth. In the crack initiation tests and Hevea-GR-S, Guayule-GR-S, and Reclaim-GR-S stocks are shown to increase in cracking resistance with increase in GR-S; in crack growth tests to decrease.

Crack growth tests of a series of cures of Hevea and GR-S are compared with tensile strength measurements. For both stocks the cure for optimum cracking life is shown to be less than the cure for optimum tensile strength.

11:40 A.M.—Buna S for Wire Insulation. ***J. H. Ingmanson, J. B. Howard, V. T. Wallder and A. R. Kemp (Bell Telephone Laboratories, Murray Hill, N. J.).***

This report gives the results of an investigation undertaken to determine some of the basic information required to aid in the application of Buna S as insulation on wires and cables. The results reported include comparisons of moisture absorption, electrical properties and compounding characteristics of Buna S with those of rubber. Electrical stability in water is related to chemical analyses. Data are also presented on vulcanization, rate of sulfur combination as related to development of tensile properties and effect of additions of organic and inorganic fillers on physical and electrical characteristics.

It is shown that unvulcanized Buna S is somewhat inferior to milled smoked sheets with respect to dielectric properties and electrical stability in water but that the vulcanized pure gum compounds compare favorably in both respects.

The power required and temperatures attained in the laboratory Banbury mixing of insulating compounds with nine different samples of Buna S and a natural rubber compound as control showed little variation. The Williams plasticity also showed little variation but no inference is made with respect to comparative extruding characteristics. Tensile strength of the Buna test compounds varied from 62 to 85 kg/cm^2 as compared with 182 kg/cm^2 for the rubber compound control. Time to attain technical cures at 134.5° C. also varied from 15 to 30 minutes for the Buna compounds as compared to 20 minutes for the rubber compound.

The brittleness temperatures of the compounds made with Buna S containing 20 to 25 per cent styrene varied from —43° to —48° C. as compared with —50° C. for the rubber compound. Compounds made with Buna S of 37 and 44 per cent styrene content gave brittleness temperatures of —27° and —10° C., respectively.

The moisture absorption, electrical characteristics and electrical stability of the nine Buna insulating compounds in distilled water at 25° C. for one month compared favorably with the values obtained for the rubber compound. Ash, water solubles, soap content and conductivity of a water extract of the ash showed correlation with electrical stability and water absorption.

The rate of vulcanization increased with increased sulfur content. Sulfur combines at a constant rate until a substantial portion of that present is combined. The amount of sulfur which combines in a given time depends on the concentration. The temperature coefficient of vulcanization as determined by combination of sulfur over the range of 134.5° to 155.4° C. was 2.07 per 10° C. It was somewhat lower than has been found for natural rubber as determined by physical properties.

Unlike rubber, substantial additions of gilsonite or blown asphalt to Buna S improve the tensile properties. The compression cutting resistance of Buna S compounds on wires are in the same range as those obtained with similar rubber compounds when tests are made at 25° C. but at 80° C. the values obtained with Buna S are considerably lower than those obtained with rubber.

The tensile properties of Buna S are deteriorated to a lesser extent on accelerated aging than are those of similar rubber compounds, however, the brittleness temperature is raised to a greater extent. The compression cutting resistance of Buna S compounds increases as a result of accelerated aging in air at 100° C. for a few days while that of rubber decreases. Tests made at 80° C. show an advantage for the Buna insulation over rubber after aging in air at 100° C.

12:10 P.M.—The Sunlight Resistance of Hycar OR Compounds. ***B. S. Garvey, Jr., and R. A. Emmett (B. F. Goodrich Co., Akron, Ohio).***

Compounding research with Hycar OR-15 and Hycar OR-25 showed that certain vulcanized compounds are highly resistant to sunlight. Oily materials such as wool grease or Vistac, which bleed to give a protective surface film, afforded moderate sunlight protection. Waxes which bloom to the surface gave protection comparable to the effect in natural rubber. Of these tested, refined paraffin was most effective. Stocks in which part of the Hycar-OR was replaced, as with 50% Neoprene-GN or 75% Thiokol-FA, showed good sunlight resistance. The results of the tests in sunlight and in ozone gave good correlation.

Thursday Afternoon—October 7

2:00 P.M.—The Evaluation of Low Temperature Properties of Several Synthetic Rubbers in Aviation Fuels Using the Dyne Tensiometer. ***R. G. Chollar, G. J. Wilson and B. K. Green (National Cash Register Co., Dayton, Ohio).***

A new improved method for evaluating increasing modulus of rubber stocks with decreasing temperature has been used in sharply defining the freeze resistant characteristics of important synthetic rubbers. The method is based upon a precise and accurate measurement of increasing stiffness through use of a dyne tensiometer.

A small sample clamped immovably at one end acts as a cantilever beam as it is flexed through a specified angle and distance. The tensiometer, sensitive to slight increments in stiffness, permits a direct reading of the force required to bend the sample. Data, secured at arbitrarily chosen temperatures, can be plotted graphically to clearly indicate the relation of stiffness to temperature.

Utilizing this method of evaluation, an analysis has been made of the effect of various aviation fuels on synthetic rubbers commonly applied where fuel and extreme low temperature resistance are required.

Test conditions are established which duplicate many operating conditions in today's aviation. Apart from determining comparative freeze resistant qualities in an air medium of the unextracted synthetic compounds, each compound is extracted in aviation fuels for 168 hours and again compared, both in an air chamber and immersed in each fuel. The data amply prove that no synthetic rubber can be assumed resistant to all types of fuels.

The basic differences of various types of synthetic elastomers (Perbunan, Hycar OR-15 and Hycar OR-25, and Neoprene FR and GN) are quantitatively compared, before and after fuel immersion. It is demonstrated that heavy plasticization, commonly used to secure low temperature flexibility, is valueless where effective extraction by fuels occurs.

2:20 P.M.—Resistance of GR-S Vulcanizates to Various Types of Aging. ***A. M. Neal and P. Ottenhoff (E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.).***

Data are presented showing the effect of various types of accelerated aging on a simple GR-S vulcanizate. The type of aging tests studied are the oxygen pressure test, the air oven test at 121° C. and the air pressure heat test at 127° C. and 80 pounds per square inch of air pressure. Results on tests of a typical smoked sheet vulcanizate in the same tests are included. The importance in GR-S vulcanizates of evaluating the effect of accelerated aging on properties other than tensile strength is stressed. Particular attention is paid to the effect of these accelerated aging tests on modulus, elongation at break, tear resistance, hardness and dynamic properties.

Data are presented showing the effect of small amounts of copper and manganese on the age resistance of GR-S vulcan-

izates as determined by the oxygen pressure test. It is shown that these metals are much less severe in their catalytic effect on the oxidation of GR-S than they are on natural rubber.

A few tests are included showing the effect of simultaneously increasing the accelerator and decreasing the sulfur on the resistance of GR-S vulcanizates to each of the types of accelerated aging. A table showing the approximate comparison of the severity of the various types of accelerated aging tests on GR-S vulcanizates with respect to changes in tensile strength, elongation at break and modulus is presented.

2:45 P.M.—Young's Modulus and Brittleness of Natural and Synthetic Elastomers at Low Temperatures. ***John W. Liska (Firestone Tire & Rubber Co., Akron, Ohio).***

The literature on the subject of low temperature serviceability of elastomers is reviewed. It is pointed out that neither brittleness nor modulus data separately suffice as low temperature indices of serviceability. A method for determining Young's Modulus in bending is described. The design of the apparatus is such that observations can be made on a fairly large number of samples subjected to identical "cold treatment."

The data presented show the change in modulus as a function of temperature in the range 0° to —60° C., (+32° F. to —75° F.). Brittleness data, obtained by a technique similar to that described by Selker, Winspear and Kemp *(Ind. Eng. Chem.*, Vol. 34, p. 137, 1942), are also presented for the same stocks.

The stocks chosen in this study were not designed specifically for low temperature application but rather with the object of obtaining the characteristics of the base elastomer in a typical gum or tread stock. The elastomers studied include natural (Hevea) rubber, GR-S, Butaprene N, Neoprene GN and FR, butadiene-styrene type polymers having different percentages of butadiene and styrene, Butyl and Butaprene NF.

Only those physical effects resulting from second order transitions are considered in the present work. The distinctions between true crystallization effects (long time) and second order transition effects (short time) are briefly discussed.

3:25 P.M.—A Method of Measuring Low Temperature Modulus Change in Vulcanized Elastomers. ***D. J. Buckley and A. L. Chaney (Esso Laboratories, Standard Oil Co. of Louisiana, Baton Rouge, La.).***

A method of measuring low temperature modulus change by means of the per cent retained elongation under constant load conditions is described. The instrument developed for this purpose consists of a telescopic arrangement of sleeves supporting T-50 type specimens. One sleeve is fixed, while the other is free to move under applied load. This displacement is measurable and represents elongation of the specimen. The determinations are carried out in a cooled ethyl alcohol medium. Temperature range employed in this work has been +20° C. to —55° C.

The relation between the elongation values obtained at room temperature and those obtained over a range of low temperatures can be expressed in terms of estimated modulus change.

The reproducibility of data obtained by use of this instrument is considered adequate. Factors affecting low temperature measurements such as the rate of cooling and rate of extension of the specimen have been studied in relation to the technique proposed.

By a proper application of the method it is possible to characterize those factors influencing loss of elasticity in vulcanizates at low temperatures. Data are presented on the relative efficiency of some plasticizers in Perbunan, with some interesting observations on the influence of a soft coal tar product with respect to low temperature change. The degree of vulcanization in GR-I vulcanizates is shown to be a critical factor in resisting loss of elasticity over a range of low temperatures. Some data are also presented on general purpose elastomers in pure gum, tire tread, and carcass type compounds.

3:50 P.M.—A New Apparatus for Determining Hardness and Creep of GR-S and Rubber Compounds at Various Temperatures. ***J. A. Talalay and R. E. Gladstone (Converse Rubber Co., Malden, Mass.).***

The present methods of determining hardness by a penetrating ball or needle type apparatus are not easily applicable at high or low temperatures. We propose to determine hardness and creep on an apparatus, created in our laboratory, which is based on the measurement of modulus of elasticity at slight deformations. Data taken on thirteen different GR-S compounds and one rubber compound, at temperatures from —50° C. to +100° C., give evidence that there is a straight line relationship between hardness, as determined on the penetrating type instruments, and the modulus at low elongations, as determined on the new apparatus. The data show that this method may be applied on very soft or very hard materials.

The apparatus consists of a lever arm with a ring placed on one end, and an adjustable weight on the other side of the fulcrum. On the ring side is a magazine which may hold up to 150 rings. The weight side moves against a scale which shows the relative deviation of the ring. The entire apparatus is enclosed in an insulated box, which may be controlled at any desired temperature. The rings (1½" O.D. x ½" I. D.) are cut with a rotating cutter from the ¼" sheet of stock used for abrasion, rebound and ring tensile tests. The magazine is used to change the rings, and the entire apparatus is operated without opening the box.

Investigations were made on the relationship between the new test and other physical properties for various loadings of different materials.

4:15 P.M.—On the Influence of Electric Fields on Rubber Latex. ***Eugene Guth (University of Notre Dame) and I. Walerstein (Purdue University).***

A.C. and three-phase fields were applied to natural rubber latex. In each case the formation of chains was observed, which disintegrated after the fields were switched off, thus exhibiting the reversible character of the aggregation. A peculiar aggregation of the chains themselves also took place.

These phenomena have general significance. The formation of the chains is most likely due to a polarization by the applied field of the electrically charged latex particles. This leads to a competition between Brownian motion and electric field and causes a chain formation if the influence of the latter is stronger.

The aggregation caused by an electric field is somewhat similar to the reversible aggregation of latex particles by a creaming agent. This specific effect of the electric field should act for instance in electro-decantation in addition to electrophoresis and gravitation.

The influence of D.C., A.C. and three-phase fields on creaming of latex was studied in dependency upon various factors.

4:30 P.M.—Carbon Black Surface Chemistry on Reinforcement of Butyl Polymers. ***R. L. Zapp (Chemical Division, Esso Laboratories, Standard Oil Development Co., Elizabeth, N. J.).***

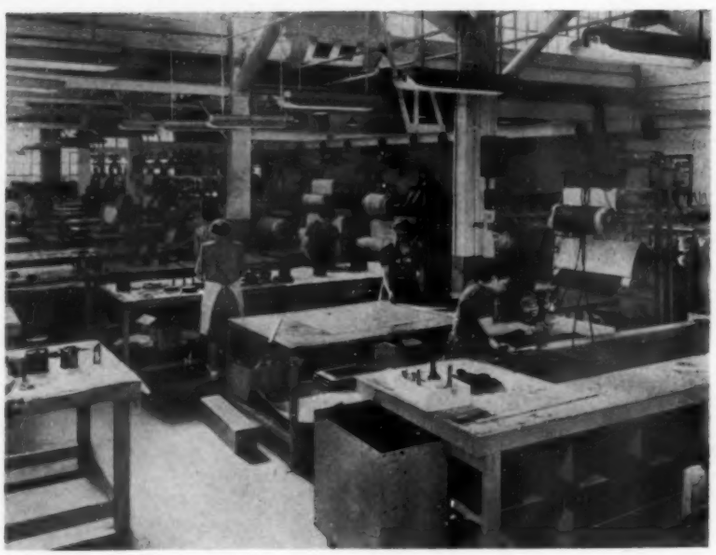
No abstract available.

Marvinol—New Elasto-Plastic

MARVINOL, a new elasto-plastic, described as "a sensational new material that promises to outmode rubber in automobile inner tubes and numerous other products," has been announced by the Glenn L. Martin Co., Baltimore, Maryland. Developed in the Martin Plastics Research Laboratory, by Clayton F. Ruebensaal and Earl H. Sorg, the new material is also suitable for the manufacture of both household and surgeons' gloves. It is said to be completely reclaimable. According to Martin engineers, use of Marvinol in inner tubes will completely eliminate the seepage of air through the sidewall of the tube.

MANUFACTURE OF FUEL

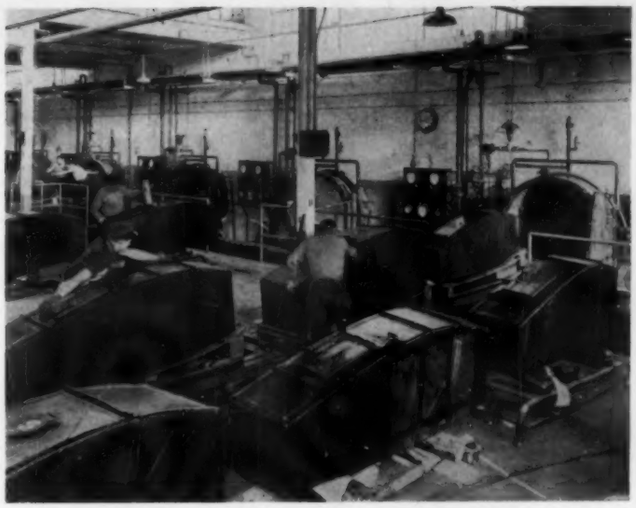
A woman worker cuts rubber gum into the shape necessary for its use in the bullet-sealing fuel tank. The gum is soft and black, and the machine permits the speedy cutting of four or five plies at a time. These tanks are able to defy even the danger of fire from tracer bullets.



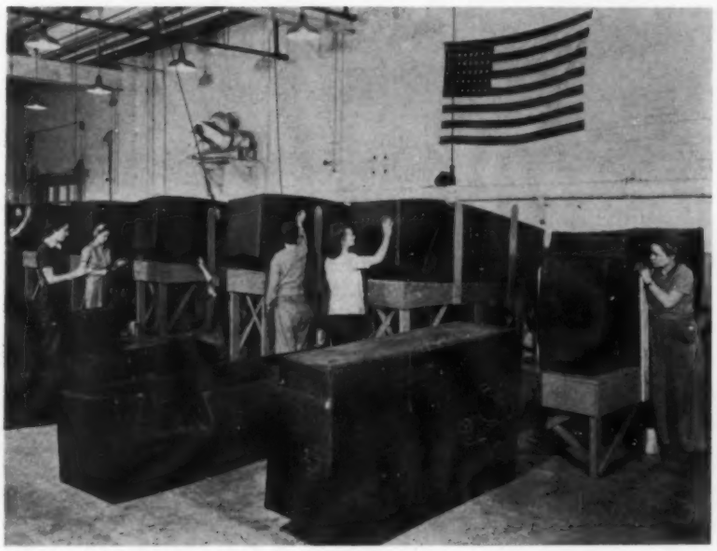
This is a general view of the stock-cutting and fitting-preparation room. Womanpower is used exclusively for the work of cutting the fabric and rubber sheeting into proper shapes and for putting the rubber gum flanges on the fittings used in the tanks.

The first step in the creation of the fuel tank is the fitting of a synthetic rubber inner-lining over the plaster form, which is the operation seen here. Cement on the corners of the form holds the inner-lining in place as it is applied. When the tank is finished, water is sprayed on the inside of the form to soften it, and workers pound the outside of the tank with rubber mallets to break up the form, which is then pulled out of the tank. Careful attention is paid to this phase of the work.

TANKS AT FIRESTONE



In assembled form, the tanks have six layers of material. From the inside out, there is an inner-lining, a layer of rubber sealant, a layer of rayon fabric, another layer of rubber sealant, and two layers of rayon fabric. In this view, the tanks are being pushed into vulcanizers.



All Firestone bullet-sealing fuel tanks must be washed before shipment. All remnants of the plaster form must be washed from the inside of the tank and the outside also must be cleaned with soap and water. Here, again, woman-power plays an important role.

When nearly ready for delivery, the fuel tanks are pressure-tested. Air at three pounds pressure to the square inch is put into the tanks, and if the pressure remains constant for ten minutes, the tanks are judged ready to be painted, stenciled, inspected, packed and shipped. The jigs in which the tanks are tested keep them from being forced out of shape by the air pressure. If a bullet rips through one of these tanks, the resulting hole closes up immediately.

Editorials . . . . . .

The Tire Controversy

THE decision of the Office of the Rubber Director to curtail the planned $95,000,000 expansion program of the tire industry in favor of increased effort to produce more tires with existing equipment and facilities came as a rude shock to the tire manufacturers, many of whom had expansion programs in the preparatory stage in view of previously expressed semi-official indications to the effect that early approval of the expansion program was in the offing. It can safely be said that several tire manufacturers attended the one-day meeting held in Washington at the request of Rubber Director Jeffers with specific plans for the location and construction of new plants.

There is, of course, a good deal to be said for both proponents and opponents of the expansion plan. As tire manufacturers have indicated, if the Rubber Director's program for 30,000,000 all-synthetic tires for essential transportation is to be met next year they need either new machinery in present factories or new factories. At least 20 to 30 per cent more milling and processing time is required to handle GR-S for tires. Although new types of machinery permit less skilled help to function adequately, the question of manpower immediately comes to the fore. Practically all tire manufacturers are working to near-capacity to meet the demands for military tires and other rubber products of a military nature. And, as has been intimated in some official quarters, the figure of 30,000,000 all-synthetic tires set for 1944 is a minimum figure, and the maximum may easily come to twice that amount.

For these reasons, the tire manufacturers want new factories to guarantee their ability to meet the demands for both military tires and tires for essential transportation next year. There is little argument over the fact that these manufacturers also have a weather-eye open for the post-war period. Location of new tire plants in the new industrial area of the Southwest, for example, would bring finished products closer to prospective consumers. The argument is also advanced that location of the plants in the Southwest, where several of the government-owned synthetic rubber plants are now functioning, would bring sources of supply closer to the manufacturing establishment.

Opposition to the expansion program was promptly forthcoming from the United Rubber Workers of America. On the surface, that organization argues that approval of construction of new factories would actually represent decentralization of the rubber industry, that the difficulty of processing GR-S is all the more reason why expansion should take place in areas where skilled tire workers are now available, and that considerably more than the 30,000,000 tires called for in 1944 can be produced in existing plants if additional machinery is installed. It will be readily understood, however, that locals of the URWA are established in existing production centers, and if new factories are constructed away from such centers the union will have a new organizing problem on its hands.

As indicated above, there is a good deal to be said for either side. The fact remains that the present official decision is to expand production with present equipment and facilities. In this connection it is encouraging to note that labor-management committees of several factories, including those of Goodyear, Firestone and Seiberling, have come forward with concrete suggestions. Putting those suggestions into actual and immediate operation may prove to be the answer to more tires in 1944.

Hail, and Farewell

ALMOST exactly one year after his appointment as Rubber Director of the United States, William M. Jeffers tendered his resignation to President Roosevelt. It was accepted in the spirit offered with the President commending Mr. Jeffers for the "real public service" he rendered during his tenure as Rubber Director. That Mr. Jeffers accomplished the task for which he was appointed is indicated by the smokestacks at butadiene, styrene and copolymer plants throughout the country. Synthetic rubber in sufficient quantity to ward off any possible shortage will shortly reach trade channels. To the words of the Nation's press following Mr. Jeffers' resignation, we can add but two —Well Done!

CURRENT NEWS OF THE MONTH

TIRE PRODUCTION TO BE INCREASED BY EXISTING EQUIPMENT AND FACILITIES

AS a result of the one-day meeting held in Washington on August 31, called by Rubber Director William M. Jeffers, between representatives of tire and tube manufacturers and of the United Rubber Workers and affiliated unions, the purpose of which was to "immediately secure increased production from existing facilities and to minimize the expansion of facilities necessary to meet present and 1944 requirements," it has been decided, temporarily at least, to "increase the output of tires with the present existing equipment and facilities through better cooperation and more attention to details on the part of both the men and management." Previously, it had been intimated that an expansion program calling for the expenditure of between $92,000,000 and $95,000,000 to provide additional floor space and manufacturing facilities for the output of synthetic rubber tires was under consideration.

The expansion program was favored by management since, as spokesmen pointed out, there is a definite need for taking any new plants "closer to the customers." In other words, as one official put it, there has been an increase in consumption of rubber products in the industrial southwest, where several of the large government-owned synthetic rubber plants are located, and placing new tire manufacturing plants in that section will serve the double purpose of production in a new market and production close to sources of supply. With regard to skilled labor, it was indicated that new machinery has decreased the need for a high degree of skill in tire building.

Union Opposed New Plants

On the other hand, union officials strongly opposed the building of new plants away from present sites, declaring that considerably more than the 30,000,000 synthetic tires called for by Jeffers' program for 1944 could be turned out next year in existing plants if additional machines were installed. These officials also claimed that the use of synthetic rubber requires more handling and processing than natural rubber and that therefore more skill is required to get satisfactoy results. They argued that any expansion of tire building facilities should be given to Akron plants because that city is the location of the largest pool of skilled rubber workers.

In view of the previous attitude of some Washington officials, the decision announced by Jeffers after the one-day meeting was considered a rebuke to the tire companies. During the discussion he emphasized that there was no place in the picture during the present emergency for limitations upon individual or group effort to bring about maximum production so urgently needed by our armed forces and to maintain our civilian transportation and that the present situation would give the rubber industry an opportunity to make a greater contribution to the war effort and at the same time set an example for all other industries where desired maximum production is not forthcoming.

According to Mr. Jeffers, "the net result of the meeting could be an immediate marked step-up in production and a substantial reduction in the proposed facilities expansion program with considerable saving of critical building materials." He expressed the hope that as a result of the meeting "the rubber companies will again critically survey the suggested expansion programs which may not be needed and this in turn will measurably avoid expanding the industry away from its presently fixed locations." Later, he indicated that any expansion program submitted by any tire company would receive full consideration and that approval for construction of new plants would be given if deemed necessary.

Final Warning by Jeffers

Mr. Jeffers formally resigned as Rubber Director of the United States on September 4. A few days later, in what has been termed his "farewell" letter to the tire manufacturers, he stated that he was convinced "there is a lag of at least 25% in output and that this can be taken up if the management and the workers will each do their part in bringing about better cooperation." He suggested that more attention be given to keeping materials up to the men and machines and that the manufacturers see to it that "machinery and equipment are kept in top-notch working condition." In closing his letter, Mr. Jeffers intimated that unless increased output is secured with present facilities and manpower there may be a breakdown in essential transportation in the country.

In industry circles it was understood that some part of the proposed expansion program has already received WPB authorization, although such authorization called for new machinery installations in existing plants for the most part. However, Goodyear is believed to have received authorization to construct a new plant in Alabama for the production of farm tractor tires, in addition to expanding facilities at its Jackson, Mich., plant. The reconversion of the Kelly-Springfield plant at Cumberland, Md., which has been producing small arms ammunition under the Army Ordnance Department for the past year, as reported elsewhere in this issue, has also been approved.

Because of the critical manpower situation in the rubber field, the industry believes that reconversion of tire plants now being used for munitions production is the quickest answer to increased

Jeffers Resigns

William Martin Jeffers, president of the Union Pacific Railroad, has resigned as Rubber Director of the United States and is returning to the railroad because he feels he can do more for the war effort as its president. The text of Mr. Jeffers' letter of resignation was made public by the White House on September 4. At the same time, President Roosevelt named Col. Bradley Dewey, Deputy Rubber Director, as Acting Rubber Director.

In submitting his resignation, Mr. Jeffers, who was named Rubber Director just one year ago, on September 15, 1942, stated that he felt the big job of getting the synthetic plants into operation is over and that he could contribute more to the war effort by getting back to the Union Pacific. The resignation came as no surprise, since it has been known for many months that Mr. Jeffers would leave Washington once he believed his job was done.

production without new plant expansion. Not only will such reconversion afford increased facilities, but equally as important it will release experienced tire workers. Rubber officials continue to point out that due to the difficulties in processing synthetic rubber, labor required will be as much as one-third more than that needed in making tires from natural rubber.

The seriousness of the tire production problem was emphasized by the statement of L. R. Coxe, car conservation officer of OPA, made at a war transportation committee meeting in Cleveland to the effect that the government has only 2,000,000 new passenger car tires in stock to meet a demand for many times that number the rest of this year. This statement gave rise to the rumor that the figure of 30,000,000 new passenger car tires set for 1944 is only a minimum figure and that the tire industry may be called on to produce about 60,000,000 passenger tires and 20,000,000 truck tires next year.

A warning was also sounded last month by Brig. Gen. Leonard P. Ayres, of the Cleveland Trust Co., whose surveys and comments on rubber activities are well known to the trade. General Ayres warned motorists who feel confident that tires will soon be available for everybody because of increasing synthetic rubber production that "it is actually all too probable that before they are available millions of cars will be laid up because of tire shortages."

Specific Programs Given

As a direct result of the one-day meeting in Washington on the tire production problem, cooperative labor-management efforts are being made at various tire factories, particularly in the Akron area. Two such programs—those advanced by the labor-management committees of Seiberling and Goodyear — were recently made public. The Seiberling program, designed to fully utilize every facility for increased production and thereby ease the nation's manpower crisis, has five major points, as follows:

(1) Encouragement by industry and labor for fullest production from every present worker through incentive pay and by suspension of artificial control of output for the duration of the war.

(2) Utilization of existing machines and skill, by proper maintenance of machinery and intelligent scheduling of available labor, to exact every possible unit of output from them.

(3) Encouragement of transfer of manpower to highest skill ratings by temporary adjustments in seniority agreements made before the war which now hinder such transfers.

(4) Promotion of the use of women workers "wherever necessary and possible."

(5) Development of tested programs to increase attendance.

The Goodyear program calls for cooperation with the manpower commission to recruit more workers, urges Goodyear employees who have not taken their vacations to postpone them, asks for intensification of the anti-absenteeism program, and proposes that former tire workers now in order departments be encouraged to return to tire departments, with special emphasis on milling operations.

Col. Bradley Dewey
Acting Rubber Director

Tire Cord Expansion

In keeping with the planned expansion on production of civilian tires and increased demand for military tires, facilities for the production of both rayon and cotton tire cord are likewise being expanded.

On August 25 WPB approved the second large expansion program for the production of rayon cord. This program provides for the conversion of machinery, now producing rayon for civilian use, to the production of 68,000,000 pounds a year of high tenacity rayon for use in tires. It brings to 160,000,000 pounds the increase in rayon cord authorized to date in connection with the tire program. A third proposal for conversion of an additional 40,000,000 pounds is still under consideration.

Plans for the latest conversion program, which hinge on whether or not labor will be available in the areas concerned, call for the 68,000,000 pounds to be divided as follows: American Viscose Corp., Wilmington, Delaware, 25,000,000 pounds; Industrial Rayon Corp., Cleveland, 22,000,000 pounds; E. I. du-Pont de Nemours & Co., Wilmington, Delaware, 11,000,000 pounds; American Enka Corp., Enka, N. C., 10,000,000 pounds. American Enka has already announced its plans for an expansion program, to meet its requirements under the new plan, which will represent an expenditure of approximately $5,000,000, and which will double the plant's production of high tenacity rayon yarn. The expansion will give Industrial Rayon a total yarn capacity of over 60,000,000 pounds per year, more than 50,000,000 of which will utilize the company's continuous process. It was also pointed out that the Cleveland and Painesville, Ohio, plants of Industrial Rayon, with a combined tire yarn capacity of more than 30,000,000 pounds, will be equipped with machinery not only for the production of tire yarn, but also for making the finished tire cord and fabric.

It has also been learned that the recently-organized firm of Synthetic Fabrics, Inc., at Bennettsville, S. C., will manufacture rayon, nylon and cotton tire fabrics. Machinery has already been installed in the new plant and the manufacture of rayon fabrics for use in military tires will begin shortly. David D. Carroll is president and treasurer of the new firm.

More Cotton Tire Cord

In the meantime, all manufacturers of cotton tire cord met in Washington on August 19 to try and develop additional production of tire cord and to take steps to assure maximum production next year. Thomas M. Bancroft, chief of the Cotton Branch of the Textile, Clothing and Leather Division of WPB, presided at the meeting.

"The programs for the balance of 1943 and 1944 require more cotton tire cord than present schedules indicate is being produced," Mr. Bancroft said. "Since these programs must be met, the meeting was called to see what could be done to get the necessary production.

"The present production of cotton tire cord is on a basis of approximately 240,000,000 lbs. per year whereas present requirements are on a basis of approximately 270,000,000 lbs., a deficit of 30,000,000 lbs. per year. It is probable that requirements will increase next year," Mr. Bancroft said.

The cotton manufacturers present indicated that they could produce the increased quantities needed only if they can (1) secure additional labor, (2) reduce absenteeism and labor turnover, and (3) operate longer hours in their present plants. If this cannot be done, then the program will require additional capacity in other areas—which will necessitate further consideration by the War Production Board and the cotton cord producers.

Frank L. Walton, Director of the Textile, Clothing and Leather Division, told the meeting that the cotton cord program is in addition to the rayon cord production programs now authorized and which total approximately 160,000,000 pounds a year, including the 68 million pound conversion recently approved.

On September 8 WPB announced that it had directed twelve producers of cotton and rayon tire cord and rayon fuel cell yarns to operate all their facilities, beginning October 1, for the maximum production of these cords and yarns regardless of any orders, regulations or directives to the contrary.

SYNTHETIC RUBBER PROGRAM RAPIDLY NEARS SUCCESSFUL COMPLETION

The spectre of collapse from the rubber shortage is definitely gone and the United States has reached the point of assurance that there will be sufficient tires to meet essential needs and keep essential driving and the military on wheels, according to Col. Bradley Dewey, Acting Rubber Director. Col. Dewey's remarks were made at a surprise visit to the meeting of the American Chemical Society in Pittsburgh on September 8, shortly after he had been named Acting Director by President Roosevelt.

The rubber program, Col. Dewey stated, now has a rated capacity of 850,000 tons a year and the plants to provide this capacity "should be finished before the end of the year." By the end of 1943, he added, there would be 17,000,000 tires available for essential drivers and in 1944 a minimum of 30,000,000. The production of synthetic rubber this month (September) will surpass 30,000 tons, he said, or approximately as much crude rubber that was consumed in the United States during the same month a year ago.

Reviewing the entire rubber picture, Acting Director Dewey expressed the belief that Latin American countries will contribute from 35,000 to 50,000 tons of crude rubber during 1944, in addition to plantation crudes expected from Ceylon and Africa. Referring to synthetic rubber tires, he said that in the course of the past few months the rubber companies have made tremendous progress and "today's high-grade passenger car tires made from all synthetic rubber is better than all but the top-grade tire of a few years ago made from crude rubber."

Admitting that large-sized, heavy-duty truck, bus and military tires still require from 10 to 30% crude rubber, he added that while only a few weeks ago it was practically impossible to make such tires so that they would not show tread cracking after less than 8,000 miles, today there are indications of solutions that offer great promise. Referring to the longer milling time required with synthetic rubber, he said that "we now know that the overall effect will not call for more than about 20% more milling and processing time than was necessary with natural rubber."

In concluding his talk, Col. Dewey said that he wanted to emphasize the fact that "history will record as one of the greatest contributions of industry to the war effort the patriotic pooling, for the benefit of the entire country, of secret technical processes and formulae, hitherto guarded as the lifeblood of the rubber, chemical and petroleum companies."

New Units are Started

Several additional copolymer units under the government's overall program have been started in recent weeks. On August 23 the large polymerization plant at Port Neches, Texas, was formally put into operation by Goodrich. This plant, which will eventually have a capacity of 120,000 tons of GR-S per year, consists of four 30,000 units, two of which will be operated by Goodrich and two by Firestone. It is the largest plant in the government program.

Beginning of manufacturing operations at this plant, known in Texas as "Rubber Rancho Grande," was observed with special ceremonies in Beaumont and Port Arthur, Texas, on August 23 and 24. Civic meetings were held, at which George W. Vaught, Goodrich vice-president, was the principal speaker. At the meeting in Beaumont, Mr. Vaught pointed out that Texas will be the source of more than one-third of the total scheduled production of government rubber, with a total production capacity of 255,000 tons. He also said that there was a good possibility that greater consumption of rubber by all countries in the post-war period might mean that instead of a rubber surplus there might be a world scarcity of rubber over a long-term period.

Butadiene for the copolymer units at Port Neches is supplied direct by pipeline from the plant of the Neches Butane Products Co., only a few hundred feet away. Neches Butane is the concern formed by Gulf, Texas, Pure Oil, Atlantic and Magnolia. Styrene will come from the plant at Texas City operated by Monsanto Chemical and that at Velasco by Dow Chemical.

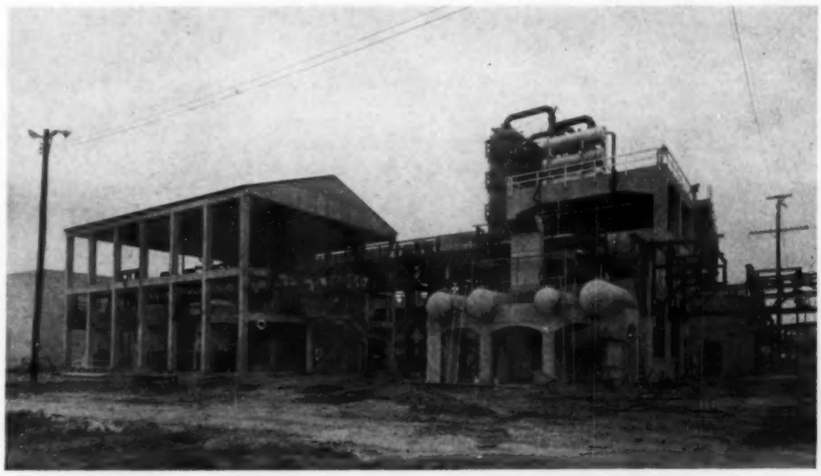
The copolymer plant at Lake Charles, Louisiana, which will be operated by Firestone, also went into production on August 27. This plant will have an annual capacity of 60,000 tons and was built by the H. K. Ferguson Co., with equipment supplied by the Blaw-Knox Co. The first synthetic rubber turned out at the plant was produced in the presence of a number of Firestone officials, including John W. Thomas, chairman of the board.

A second unit of the copolymer plant at Naugatuck, Conn., operated by U. S. Rubber, has been completed, bringing the production of GR-S at this plant up to a capacity of 30,000 tons per year. This is one of the pioneer plants in the government program. According to the Blaw-Knox Co., which installed all of the equipment at the Naugatuck plant, more than 50 miles of pipe, more than 10,000 valves, and numerous large tanks and pressure vessels weighing as much as 10 tons each were required for the job. A total of 200 railroad cars of equipment has been installed.

Kobuta Plant Nearly Ready

The Kobuta plant in Beaver County, Penna., operated by the Koppers United Co., largest butadiene plant in the government's program, is expected to attain full operation by the end of this month. The plant already has three butadiene units and its entire styrene unit in production, with only one butadiene unit remaining to be completed. When in full operation, the Kobuta plant will supply 80,000 tons of butadiene and 37,500 tons of styrene annually. About 240,000 gallons of industrial alcohol will be used daily.

It has also been learned that a large butadiene plant is being pieced together from materials salvaged from equipment warehouses, shut-down refineries and junkyards by the Lion Oil Refining Co. Located near El Dorado, Arkansas, the plant will be among the first of its kind to go into operation and will employ a new process which company officials said had been developed from laboratory stage to plant operation in a remarkably short



The above battery of reactor tanks is one of two such units installed at the government-owned synthetic rubber plant near Houston, Texas. The plant, operated by the Goodyear Tire & Rubber Co., has a capacity of 60,000 tons per year. It was built by the George A. Fuller Company.

time. No details of the process were furnished.

Synthetic tires made by Goodyear from butadiene based on sulphite liquor, waste product of paper mills, are currently undergoing road tests. A plant for the conversion of this waste product into ethyl alcohol, from which it is transformed into butadiene, was recently completed by the Ontario Paper Co., a subsidiary of the *Chicago Tribune*, at Thorold, Ontario, Canada. Actual conversion of the alcohol into butadiene was performed by the Celanese Corp. of America.

In all, Goodyear made 36 tires for the *Chicago Tribune*, some of which were tested on August 28 at the Indianapolis Motor Speedway. Driven for 17 consecutive hours at 35 m.p.h., the tires were said to have shown little wear, although air expansion was slightly higher than that shown by natural rubber tires under similar conditions. Additional tests will be held in other sections of the country to impress the public with the need for proper tire care.

USE OF CEMENT FURTHER REGULATED BY AMENDMENT TO R-1 ORDER

Many of the uses formerly permitted in the manufacture of shoes for natural rubber cement have been discontinued and cement which contains natural rubber may be used after October 1 in the manufacture and repair of shoes in a much more limited number of operations under the terms of Amendment No. 4 to Rubber Order R-1, issued by WPB on September 7. The amendment was issued as a further rubber conservation order and reflects dwindling crude rubber stocks.

Under the amendment, cement may be used in the manufacture, application or repair of any product the manufacture of which involves the permissible use of rubber. Synthetic rubber or balata, and cement which does not contain crude rubber or natural latex, may be used in the manufacture and repair of shoes without restriction.

A provision is included to the effect that all purchasers of cement must provide the seller with a certificate that he is familiar with R-1 restrictions on the use of cement, and that the cement specified in the purchase order will be used in the manufacture or repair of products in the manufacture of which rubber, synthetic rubber or balata is permitted, in certain shoe manufacture or repair operations, or for folding or assembling component parts of luggage, handbags, belts, small leather goods and millinery.

It is expected that insistence by dealers in demanding such certificates will end numerous abuses under the order.

Amendment No. 3 to R-1, also issued on September 7, suspends preference ratings on rubber heel and sole products to fill civilian orders, to prevent the possibility of upsetting present methods of distributing these products. Military orders still receive preferential treatment.

Industrial tires and tubes used on factory and warehouse trucks and dollies, can now be obtained when it is certified that they will be required for replacement within 30 days. This eliminates the difficulty experienced under the original certification, which restricted industrial tire and tube replacement to one-third of the quantity mounted in the previous 90 days. Many small users had no occasion to mount industrial tires and tubes during the base period.

Another clause in Amendment No. 3 makes chlorinated rubber subject to special authorization of WPB, thus reinstating controls formerly exercised under Supplementary Order M-46, which was superseded by Rubber Order R-1.

DRUG SUNDRIES

Reduction of manufacturers', wholesalers' and retailers' maximum prices of virtually all rubber drug sundries in which synthetic rubber is used, in order to reflect deductions made before August 1 in the price of synthetic rubber, was accomplished by OPA on August 12 with the issuance of Amendment No. 10 to MPR 300 (Manufacturers' Maximum Prices for Rubber Drug Sundries) and Amendment No. 8 to MPR 301 (Retail and Wholesale Prices for Rubber Drug Sundries). Both amendments were effective August 19.

The only exception made in the amendments is for neoprene bulbs and bulb goods and neoprene catheters. It was pointed out, however, that the current maximum prices and differentials for these specific neoprene products are effective only to September 30, 1943, and that there has not been sufficient industry experience to enable OPA to establish permanent maximum prices and differentials for them, therefore it would be unreasonable to require their manufacturers to reprint their price lists in August and again in September.

Retail ceiling prices for hospital-grade hot water bottles and combination syringes made of synthetic rubber, in line with pre-war prices for the same grade when made of crude rubber, are covered in the amendments, as are manufacturers' and wholesalers' maximum prices for sales to hospitals. Restrictions on crude rubber have prevented use of that material in making the hospital-grade of hot water bottles and combination syringes for sale to individual consumers, although it could be used for goods sold to hospitals. But the current availability of synthetic rubber makes the grade once more available to individual buyers.

While no price increase is represented by the ceilings set for the hospital grade on sales in the retail market, because they are at the same level that existed before the war for sales of the same grade when made of crude rubber, these prices have always been above those for hot water bottles and combination syringes of lower grades. (The hospital grade is made to more stringent specifications and is more durable and serviceable than those grades not made especially for use in hospitals.)

Thus the maximum retail price for the Victory line hospital grade molded hot water bottle made of synthetic rubber is $1.30. Retail ceilings for two lower grades, which were in the regulation already, are $1 and 75 cents, respectively. The retail ceilings for three types of the Victory line hospital grade combination syringes range from $1.65 to $2.20. Combination syringes of the lower grade already priced in the regulation range from $1.10 to $1.90.

RUBBER FOOTWEAR

Basically determined by restrictions on the use of rubber, minimum specifications that most waterproof rubber footwear must meet to be entitled to the specific manufacturers' prices established in MPR 132 (Waterproof Rubber Footwear) are contained in Amendment No. 3 to that regulation, issued by OPA on September 2. Adoption of the minimum specifications is in conformance with the Taft Amendment to the Emergency Price Control Act of 1942. The specifications are necessary to secure effective price control, as no practicable alternative exists.

The specifications are intended to protect the consumer, and also the manufacturers. Without them, OPA said, it would be impossible to effect price control of the footwear for there would be no way to prevent the sale of lower quality footwear at ceiling prices. Besides being a hidden price increase to consumers, sale of lower quality footwear at ceiling prices would discriminate against manufacturers who make the best quality footwear that is possible under WPB's restrictions on the use of rubber.

If waterproof rubber footwear covered by the regulation cannot meet the specifications established for it by the amendment, the manufacturer must apply to OPA for a maximum price for it.

According to an announcement by OPA on August 18, non-leather shoes with soles containing a small percentage of reclaimed rubber or made from low-grade friction scrap may be sold ration-free. Since the Office of the Rubber Director is making a limited quantity of reclaimed rubber available for the production of non-rationed footwear, the shoe rationing regulations have been amended so that non-leather shoes may be sold ration-free if the soles are made principally of wood, rope, fabric, or fibre, in which reclaimed rubber is used in an amount not exceeding 15% by volume. The action was taken in Amendment No. 32 to Ration Order 17 (Shoes).

BOOTS AND SHOES

Relaxation of the regulations governing rationing of below-the-knee lightweight rubber boots, known as Type 4, so

as to extend their availability to persons whose occupations are not classed as essential, and to give some employers the opportunity of furnishing their employees with rubber footwear, are contained in Amendment No. 3 to Ration Order 6A (Men's Rubber Boots and Rubber Work Shoes), issued by OPA on August 21 and effective August 26. The amendment also releases from rationing certain kinds of rubber boots useful in farming and similar work, but no longer being manufactured for general use. A summary of the new provisions follows:

1. Consumers are eligible for ration certificates for below-the-knee lightweight boots (Type 4) if they need this protection in their work, regardless of whether or not their work is deemed "essential." Formerly Type 4 boots were available only to persons whose work was essential to the prosecution of the war, the protection of public health or safety, or the maintenance of mines. Type 4 boots contain considerably less crude rubber than other rationed types, and it is now possible to increase production and make these boots available to consumers under broader eligibility requirements.

2. Employers are permitted to obtain rubber footwear to furnish to employees who are eligible users, even though the employers have not customarily furnished such footwear. Previously, employers who normally and customarily furnished rubber footwear to their employees were the only ones who could get certificates to continue the practice. The restriction is being lifted chiefly to accommodate employers who have converted their businesses and now employ workers who need the protection of rubber footwear. The employers must keep title to the footwear.

3. All olive drab, clay, or khaki-colored rubber boots, all over-the-shoe rubber boots, and all light-weight ankle-fitting rubber boots which depend upon stretch at the ankle for fitting, are released from rationing. These boots, usually light in weight, have little industrial value but are useful in farming and similar work. Under War Production Board limitations, they are no longer being manufactured for general civilian use. Quantities released will be small, since dealers do not have complete stocks on hand.

4. Each dealer having in stock any rubber footwear released from rationing is required to attach to his inventory form a statement of the number of pairs of each type released, and to send a copy of the statement to his OPA district office. This must be done before the dealer sells any such rubber footwear ration-free.

RUBBER HEELS

Under the terms of Amendment No. 11 to MPR 200 (Rubber Heels) posters on ceiling prices for rubber heels and the attaching of rubber heels were required to be exhibited by shoe repairmen in their places of business by August 5. Because OPA found it impossible to prepare and distribute these posters in time, it issued Amendment No. 12 to the regulation on August 21 postponing the date until October 5.

SCRAP RUBBER

Under the terms of Amendment No. 8 to RPS 87, as Amended (Scrap Rubber), maximum prices for bicycle inner tubes sold for the manufacture of rubber bands, as well as hard rubber scrap, must be figured according to the General Maximum Price Regulation. Persons dealing in scrap rubber during March, 1942, shall be deemed to be competitive sellers of the same class as the Rubber Reserve Co. The amendment was issued on August 7 and became effective August 13.

RUBBER MACHINERY

Manufacturers of rubber processing machinery and equipment are subject to new scheduling and shipping directions under the terms of General Limitation Order L-143-a as Amended August 25, 1943. Under the revised order, WPB may from time to time request all the manufacturers of a particular item to file operation reports and schedules of unfilled orders. When so requested, each manufacturer shall file the specified forms, one of which will be returned with shipping directions noted thereon and which must be considered as a "frozen" schedule within the meaning of Priorities Regulation 18 for the number of calendar months designated by WPB.

It is stated that each manufacturer must make shipments in accordance with his "frozen" schedule, notwithstanding any other preference order, directive or regulation of WPB, but subject to Priorities Regulation 18, and must so schedule his production as to meet the shipping dates prescribed in the schedule.

If a manufacturer is unable, for reasons beyond his control, to fulfill his frozen schedule on time, or if he is able to make shipments ahead of schedule, he must in either case make shipments, as far as practicable, in the same sequence as required by the schedule. In any case where the delay or acceleration in shipments will affect dates of shipment by more than 15 days, the manufacturer must notify WPB of certain facts, including the reason for the delay or acceleration.

EXPANSION OF GUAYULE PROGRAM FORECAST BY RUBBER OFFICIALS

Now that the synthetic rubber program is rapidly nearing its conclusion, from the standpoint of productive facilities, more attention has been turned to securing the crude rubber which is still essential in the manufacture of large-sized, heavy-duty truck, bus and military tires, as well as for some other types of products of a military nature. It is believed in rubber circles that two definite steps are in the offing: (1) Expansion of the curtailed guayule program; (2) Greater authority to the Rubber Development Corp. to secure increased supplies of crude rubber from Latin America and other sources.

In the opinion of certain rubber authorities, including William O'Neil, president of General Tire, it was a mistake to have so heavily curtailed the authorized guayule program. It will be recalled that the program was curtailed after getting off to a fine start, because the land on which it was being cultivated was required to grow food. It is believed that in view of the fact that food shortages are still a major problem, and manpower being what it is in the California region, expansion of the program may call for cultivation in Texas and Arizona and, more probably, in Mexico.

In a telegram addressed to various Congressional leaders, and to those heading up the rubber program, Mr. O'Neil declared that the supposed drawbacks to guayule are overcome and that if the government will put its full weight back of its production the natural rubber needed for mixing with synthetics in large tires can readily be obtained. He claimed that "experiments made by the Forest Service indicate that a one-year harvest of guayule is practical, and thus the final bottleneck is removed," and added that "the amount of rubber to be obtained from this source (guayule) need be governed only by the amount required to mix with synthetics."

Latin-American Developments

Although it is still too difficult to make any definite forecasts of rubber imports from Latin America because of the transportation problem, difficulty of ascertaining stocks and production figures in remote areas and the shortage of manpower in some of the best potential rubber-producing areas, such as the upper Amazon, there are indications that imports into the United States are steadily rising.

According to a recent statement by Everett G. Holt, now chief of the commercial research section of the Rubber Development Corp., rubber-producing regions of the Americas shipped 50% more rubber in the first four months of 1943 than in the comparable 1942 period. It should be kept in mind that percentage figures are not too important when the actual production figures are not furnished.

However, prospects are now considered good for the realization of the 1943 import goal of 41,000 tons from hemisphere sources set by the Baruch Rubber Committee in its study of the rubber problem. Whether the unofficial goal of 100,000 tons in 1944-45 is reached depends on how successful the authorities are in overcoming transportation, food supply, diseases, and manpower obstacles.

How hundreds of tons of wild rubber are being flown monthly from South America to the United States was recently told by Captain Jack Knight, chief pilot of the Rubber Development Corp., who heads the flight personnel of that organization. According to Capt. Knight, a fleet of 12 planes, most of them Catalina boats, are used in the pioneer work of locating the rubber fields. Workers and supplies are landed and the planes keep contact with the parties, bringing additional supplies and leaving with cargoes of rubber. As much as six tons can be transported in one Catalina.

According to Valentim Boucas, director of a Brazilian commission for control of agreements with Washington, Brazil's output of rubber in the Amazon Valley increased 60% in the first four months of 1943 compared with the same period last year. More than 20,000 people, he said, have been moved into the Valley in preparation for further expansion in the drive to raise output from the Amazon forests to 50,000 tons or more in 1944. He revealed that more than $20,000,000 is being spent on development of rubber production.

Word has been received that nearly all of the machinery, supplies and equipment purchased for the modern rubber laboratory at the Instituto Agrinomoco do Norte at Belem, Brazil, have arrived and are in the process of being installed. Investigations on methods of tapping and the preparation of crude rubber, under the supervision of Norman Bekkedahl and Fred L. Downs, have been launched. The location of the laboratory gives it convenient access to a wide variety of rubber-producing trees and plants.

The expansion of the rubber industry in Ecuador from 400 tons per year prior to 1941 to 3,000 tons in 1942 has already been recorded. That continued expansion is a certainty is indicated by a recent report of the Ecuadoran Development Corp., the governmental agency charged with the rubber program in that country. Extensive exploration of the Oriente region has revealed the existence of thousands of tons of wild rubber. The development and production of this rubber has already been started, although additional surveys are still under way, more trails are being cut, and more trading posts are being established. It is not inconceivable that Ecuador will double its 1942 output of rubber this year.

Haiti is scheduled to go into production of rubber from the quick-growing cryptostegia vine in 1944. Some estimates are that Haiti may produce as much as 10,000 tons from this source next year, but calculations are judged a bit uncertain in the light of tapping difficulties and lack of large-scale experience with production of cryptostegia rubber.

Progress is also reported from the Madre de Dios region of Peru, reported to be a promising rubber-producing area. A health dispensary has already been set up under extremely difficult conditions, with medicines and supplies being flown over the high Andes ranges. Current facilities will shortly be enlarged to include a small hospital and dispensary unit with a 10-bed capacity.

"CARPET PILE" RETREADING MATERIAL DEVELOPED BY ALEXANDER SMITH CO.

Automobile tires with "carpet and rubber" retreads were exhibited at Yonkers, N. Y., on August 24, by the Alexander Smith & Sons Carpet Co. The retreaded tires exhibited were reported to contain only 40% as much rubber as the standard retread in general use. The new retreading material, which has been under development and test for more than a year in the company's product engineering department, is the invention of F. H. Mackenzie, now a First Lieutenant in the Army Engineer Corps.

The Alexander Smith retread is a cotton pile fabric, similar in appearance to an uncut pile carpet, except that strips of rubber are inserted in the pile loops during the weaving operation. The two basic materials are molded with heat and pressure into a homogeneous tread in which the cotton pile is essentially vertical. The wear thus occurs on the ends of the cotton yarns.

Wear tests with actual road runs of up to 6,500 miles have been made not only by Alexander Smith but also by one of the large tire manufacturers which reported its results to an industry committee as follows: "Combining the foregoing service and weight data, it appears that the carpet pile 'F' recap unit gives 70% to 75% of the service obtained from a standard recap and uses only 40% as much reclaim and rubber to do it."

In the figures accompanying this report, comparison was made between a standard recap containing 7.40 lbs. of reclaimed rubber which had gone 8,000 miles or 1,080 miles per pound of reclaim, and an Alexander Smith "carpet pile" retread containing 3.17 lbs. of reclaim which had gone 6,000 miles or an average of 1,900 miles per pound of reclaim.

No definite marketing plans have been formulated as yet for the Alexander Smith retread. Because of the higher manufacturing costs involved these will be dependent on the degree of importance which the Government attaches to stretching the present stockpile of reclaimed rubber. With all the development work complete, however, reports are being prepared for Washington. If these result in a call to produce and distribute the fabric as a rubber conservation measure, the carpet industry could make a tremendous yardage by converting looms not now in use on war work.

Set Synthetic Tire Prices

Maximum prices for synthetic rubber tires and tubes when sold by manufacturers, wholesalers and retailers were established by OPA on September 6 with the issuance of Amendment No. 14 to RPS 63 (Retail Prices for New Tires and Tubes) and Amendment No. 7 to MPR 143 (Wholesale Prices for New Tires and Tubes). In the main, the prices set are the same as ceiling prices for corresponding tires and tubes of crude rubber.

Although OPA was informed at meetings with tire and tube manufacturers that production costs have increased and that increased maximum prices should be granted for tires and tubes made of synthetic rubber, it was finally agreed that there had not been enough production experience to make possible a well-founded permanent decision. The current action preserves the status quo on tire prices until there is evidence to indicate clearly what changes, if any, should be made. There is little doubt, however, that the prices will be increased in the future.

Production of synthetic tires and tubes under orders of the Office of the Rubber Director makes necessary some special arrangements for their pricing which differ from those for natural rubber tires and tubes. New synthetic passenger-car tires, for example, will be made generally in one construction whose minimum specifications are given by the ORD. The maximum price assigned by OPA to this one construction in each size is the maximum price for the base level brand of the brand owner for his crude rubber tire of that size. This will be true even though the brand owner may be forced to use molds having brand names different from his base level brand.

In cases in which the synthetic rubber passenger-car tire is of a size that formerly was not on the brand owner's list in his base level brand, its ceiling price is established by a percentage relationship (according to percentages given in the regulation) to the ceiling price of the 600-16 size in the base level brand. These percentages will give the new size a maximum price in line with the other ceiling prices of the brand owner.

Maximum prices for new synthetic rubber tires and tubes other than those for passenger cars are the same as the maximum price for the natural rubber tire or tube in the same type, brand, and size of each brand-owner.

In both regulations an additional change extends discounts for factory seconds, which formerly applied only to passenger car and truck tires and tubes, to all other tires and tubes as well. This is in line with past industry practice, which normally allowed discounts on seconds of all types.

Although several changes are made in Maximum Price Regulation 143, besides those establishing ceilings for new synthetic tires and tubes, and extending the discounts for factory seconds, they do not change substantially the result which was obtained previously under Maximum

Price Regulation 143, but provide a more precise method for achieving it.

The primary pricing provisions of Maximum Price Regulation 143 have been re-worded to make them clearer and more suitable to industry practice, and also to effect some change in the method of computing maximum prices generally.

Earlier, on August 27, OPA issued Amendment No. 13 to RPS 63 setting specific maximum retail prices for additional sizes of a few brands of truck tires and tubes of eight brand-owning companies at the same levels as ceiling prices of the same sizes of similar tires and tubes already listed for other brand-owners. This action neither raised nor lowered prices to consumers.

Amendments to Ration Order

Five additional amendments to Ration Order 1A (Tires, Tubes, Recapping or Camelback) have been issued by OPA since our last report, as follows:

Amendment No. 45, issued August 18 and effective August 23, sets up the procedure to be followed for importing new tires and new tubes into the United States. It specifically exempts importers in some cases from requiring OPA authorization to bring in tires and tubes. Any tube driven less than 1,000 miles is defined as a new tube.

Amendment No. 46, issued and effective August 18, authorizes dealers with recappable truck tire carcasses in their possession to get truck-type camelback needed to recap such tires by applying to their OPA district office, and manufacturers to sell used truck tires to dealers without rationing certificates under authorization of the district office. Two other minor changes were included in this amendment.

Amendment No. 47, issued August 28 and effective September 2, broadens the tire rationing eligibility rules to provide recapping services and new tubes upon certificate for all commercial vehicles, regardless of the use to which they are put. The Rubber Director has assured OPA that sufficient truck-type camelback is available to meet the demands of all commercial motor vehicles.

Amendment No. 48, issued and effective August 25, removes rationing restrictions on the use of Grade C camelback in recapping services. Previously available for only the largest truck and bus tires, Grade A camelback is now obtainable for recapping tires of all trucks and buses, although it is still subject to rationing. The quality of camelback for passenger cars will be improved from Grade F reclaimed rubber to Grade C synthetic stock. The definition of passenger-type camelback has been changed to include Grade C as well as Grade F camelback, with the definition of truck-type camelback limited to Grade A stock.

Amendment No. 49, issued and effective August 28, outlines new rationing provisions for adding tires being salvaged from government scrap piles to the supply of used and recapped passenger tires. It also provides similarly for the transfer upon authorization of used passenger tires now in the hands of manufacturers. Previously, manufacturers could transfer such tires only in exchange for ration certificates. In all cases, however, consumers will continue to buy used tires only upon presentation of ration certificates.

In addition to the above amendments to the rationing order, the Office of Defense Transportation announced on August 24 that eligible truck operators who hold tire rationing certificates but who are unable to locate within their county the proper tires may apply to their nearest Motor Transport District Office of ODT for assistance. The information will in turn be transmitted to the Office of the Rubber Director which will endeavor to arrange for the proper redistribution of tires so that all the certificates can be honored as quickly as possible after issuance. It was later announced (on August 27) that bus and taxicab operators in the same predicament may take similar action.

Amend Recapping Prices

In response to requests from the tire recapping field, OPA issued Amendment 5 to RPS 66 (Retreaded and Recapped Tires and Retreading and Recapping Services) on August 17 giving dollars-and-cents ceiling prices for recapping truck and bus tires with ground grip treads. The new ceilings apply to a number of tire sizes in addition to those previously so priced.

In the same amendment, OPA restored to the recapping and retreading price schedule a table of ceiling prices for recapping tires for tractors with rice and cane special service and farm tractor types of tread made of Grade C camelback. This table was removed from the schedule on June 7 when recapping such tires with Grade C camelback was discontinued. It was replaced to provide ceilings for any Grade C camelback that may be available.

Another change made by the amendment provides that specifications issued by the War Production Board for camelback of grades A, C and F are adopted by the OPA as its specifications for those grades of camelback. This gives the schedule enough flexibility so that recapping with any camelback (such as that made of crude, reclaim, or synthetic or substitute rubber) which the WPB brings within scope of the grades is covered by ceiling prices in the schedule.

Tire Quota Virtually Unchanged

The number of new and used passenger car and truck tires made available for rationing during September, announced by OPA on August 26, remains virtually unchanged from the August figures. The quota for Grade I tires (new passenger car tires) was set at 829,659, as against 829,000 in August, while the figures for Grade III (used or recapped passenger car tires) were 645,175 and 644,000, respectively. A total of 737,362 new tubes were provided for September, which compares with 757,160 in August.

Quotas for new truck and bus tires and tubes in September were slightly below those for August, the figures being 416,142 new tires as compared with 417,265 in August, and 330,169 new tubes, as compared with 356,639. A warning was issued that the shortage of new truck tires is increasing in seriousness and local rationing boards were instructed to issue certificates for used rather than new truck tires whenever possible. The quota for new farm tractor and implement tires for September was continued at 73,600.

Control in Virgin Islands

The use, care and acquisition of tires, tubes and recapping services in the Virgin Islands are now controlled by Ration Order 1C. In order to obtain a tire or tube or secure recapping services, the customer must file an application giving proof of his actual need, of the eligibility of his vehicle, and must meet all specified standards set by OPA. Allotments of tires and tubes may be granted to dealers, but limitations are placed on the number of Grade I and III tires. Periodic inspection and declaration of tires are required under the terms of the order.

Construction of additional manufacturing facilities for Resinox phenolic resins and molding compounds at the Springfield, Mass., plant of Monsanto Chemical Co. has been approved by WPB. The increased capacity will be devoted entirely to high-priority war applications.

Post-War Planning

There is no question that when the war ends the United States will be faced with the biggest employment problem in its history. Jobs will have to be provided for some 10,000,000 men in the armed forces and millions more now in war work, most of whom will want peacetime jobs. Most of our readers are familiar with some of the steps being taken by various government and business agencies to meet the coming emergency. We recommend, however, that every rubber manufacturer secure copies of two new booklets on this subject: (1) *Plan Postwar Jobs—Now,* issued by the Committee for Economic Development, Department of Commerce Building, Washington, D. C.; (2) *Community Action for Post-War Jobs and Profits,* issued by the Bureau of Foreign & Domestic Commerce, Washington, D. C. Write for these booklets today. Digest them. Act on them. Today's planning means tomorrow's security.

AMERICAN CHEMICAL SOCIETY HOLDS PITTSBURGH MEETING

As this is being written, the American Chemical Society has just concluded its 106th Meeting at Pittsburgh, Penna. The meeting was held from September 6 to 10, with most of the technical sessions in the William Penn Hotel. All divisions of the Society were in session except the Division of Rubber Chemistry which will hold its Fall meeting at the Hotel Commodore in New York City on October 5, 6 and 7.

A number of papers of interest to the general rubber industry were presented at meetings of various divisions at Pittsburgh. Included among papers offered at the meeting of the Division of Cellulose Chemistry was one on "Fibrillar Structure of High-Tenacity Rayon," by L. M. Welch and W. E. Roseveare, of DuPont, and another on "Elasticity, Creep and Recovery of Rayon Yarns," by J. Press and H. Mark of the Polytechnic Institute of Brooklyn.

Four papers given at the sessions of the Division of Colloid Chemistry were of special interest. These were: "Methods of Electron Diffractions," by L. H. Germer (Bell Telephone Labs.); "Some Progress in the Use of X-Rays in the Field of High Polymers," by I. Fankuchen and H. Mark (Brooklyn Polytechnic Institute); "Method of Purifying and Concentrating Colloidal Dispersions by Electrodecantation," by Paul Stamberger; and "Centrifugal Methods in Colloidal Research," by Elmer O. Kraemer (Biochemical Research Foundation).

Discuss Permeability of Gas

"The Permeability of Hydrocarbon Gases through Rubber Tubing," was the title of a paper delivered by Messrs. Riley, Stross and Eby, of the Universal Oil Products Co., at one of the sessions held by the Division of Petroleum Chemistry, an abstract of which follows:

"Hydrocarbon gas permeation for planar films of rubber varies inversely with thickness of the film and directly with the area. Likewise, permeation of gases through rubber tubing varies directly with the inside diameter, and inversely with the wall thickness.

"For a single type of rubber tubing, the permeability of different gases varies over a wide range. In general, olefins permeate rubber more rapidly than paraffins; hydrocarbons of the C_4 range much more rapidly than those of lower molecular weight.

"Synthetic rubbers—e.g., neoprene and particularly Koroseal—are far less permeable than any compounds of natural rubber tubings. Plastic tubings such as Resistoflex are much superior than either synthetic or natural rubber. Synthetics of the Buna and Butyl types were not investigated."

Also of special interest to the rubber field was a paper on "Thermodynamics of High Polymer Solutions. II. Dilute Solutions," given by Paul J. Flory, Chemical Division, Esso Laboratories, Standard Oil Development Co., Elizabeth, N. J. This was delivered during the meeting of the Division of Physical and Inorganic Chemistry and indicated that the effective size of polymer molecules in solution estimated from the osmotic pressure-concentration relationship are in rough agreement with similar estimates based on viscosity measurements.

Coming Events

Sept. 23. Buffalo Rubber Group, Hotel Westbrook, Buffalo, N. Y.

Sept. 29-30. Fourth Mid-American Chemurgic Conference, Hotel Gibson, Cincinnati, Ohio.

Oct. 5. Los Angeles Rubber Group, Hotel Mayfair, Los Angeles, Cal.

Oct. 5-7. Rubber Division, ACS., Fall Meeting, Hotel Commodore, New York, N. Y.

Oct. 5-7. National Safety Council, Sherman, LaSalle and Morrison Hotels, Chicago, Ill.

Oct. 15. Chicago Rubber Group, Hotel Morrison, Chicago, Ill.

Nov. 14-16. American Institute of Chemical Engineers, Pittsburgh, Penna.

Dec. 6-11. 19th Exposition of Chemical Industries, Madison Square Garden, New York City.

Promotions at DuPont

Several changes have been made in the executive set-up of the Rubber Chemicals Division, Organic Chemicals Department, E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware, effective September 15. S. G. Byam becomes sales manager and V. A. Cosler sales development manager, both reporting to C. A. Bartle, director of sales. A. J. Northam becomes assistant director of the Rubber Laboratory in charge of sales service. H. G. Bimmerman continues as director of the laboratory and A. M. Neal as assistant director in charge of research. In the absence of the director, Mr. Northam will assume his responsibilities. The changes were brought about by the promotion of A. J. Mease, who has been assistant to Mr. Bartle, to assistant manager of the Boston office of the company's organic chemicals department.

The Scioto Ordnance Plant, operated by U.S. Rubber near Marion, Ohio, was one of eight such plants at which operations were recently halted, according to a communication sent on July 20 by the War Department to the House Military Affairs Committee.

THERMOID TO TAKE OVER JOSEPH STOKES RUBBER CO.

In a letter addressed to all stockholders of the Thermoid Company, of Trenton, N. J., under date of August 27, F. E. Schluter, president, revealed that the company is planning to acquire all the shares of the Joseph Stokes Rubber Co., also of Trenton, including the Joseph Stokes Rubber Co., Ltd., of Welland, Ontario, the Canadian subsidiary, and make it a wholly owned subsidiary of Thermoid. A proposal has already been submitted to the Stokes concern and interests representing 97% of the stock of that company have accepted it. Formal acquisition is expected shortly.

The combined sales of the Joseph Stokes Rubber Co., which was established in 1897 and which manufactures hard rubber and plastic products, and of its Canadian subsidiary, are reported at approximately $4,700,000 for the year ending June 30, 1943. The Canadian subsidiary is of more recent origin than the Trenton company, the factory in Welland having been started about 20 years ago and expanded substantially in more recent years.

In making the announcement, Mr. Schluter pointed out that Thermoid makes many molded rubber products and dry molded brake linings and clutch facings which also fringe the plastics field. Therefore, he said, acquisition of Stokes should mean present and postwar opportunities for a combined development program. The Canadian subsidiary should be especially valuable to Thermoid, he indicated, because tariff conditions make it desirable to produce the regular Thermoid products in Canada and for export to British possessions.

The acquisition was also publicly approved by W. J. B. Stokes, II, president of Stokes Rubber, who, among other things, pointed out that the affiliation should make available to Stokes the nation-wide sales organization of Thermoid "which, in its industrial rubber division, receives many unsolicited orders for hard rubber products."

To Reconvert Kelly Plant

The plant of the Kelly-Springfield Tire Co. in Cumberland, Maryland, is to be reconverted as soon as possible to tire production after more than a year's operation in small arms ammunition production, according to a recent announcement made by Edmund S. Burke, president of the company, and Major E. J. Hill, commanding officer at the plant. The announcement indicated that this is the first major war plant in Maryland, if not in the United States, to return to the manufacture of its peace-time products. The greater part of the basic force in the plant is made up of experienced rubber workers who were formerly employed in producing tires, which will considerably facilitate the reconversion. About half of the present force are women.

WAYNE UNIVERSITY REPORTS ON RUBBER-PLASTIC PROJECT

Dr. C. W. Selheimer, of the Department of Chemical Engineering of Wayne University, Detroit, Mich., recently submitted a report to the Detroit Rubber & Plastics Group, Inc., on the rubber and plastics project sponsored by the group at that university. The report follows:

Instruction: Under the direction of the Federal Office of Education, Washington D. C., courses (a) Technology of Plastic Materials and (b) Laboratory work in Plastic Materials are being given to large numbers of students. These are non-credit courses under the Engineering, Science, Management, and War Training program, designed specifically for upgrading of employees in industry.

Courses for College credit in the Technology, Processing and Testing of Plastic Materials are now being offered during the regular school year. These are advanced courses in the Department of Chemical Engineering, but are open to others having the necessary background for admission. They will be offered mainly in the evening.

Laboratory: To house the laboratory equipment the University has set aside one whole building in the block of land recently acquired, immediately north of the main building. This building is located at 400 West Warren. It is a two story brick, formerly a garage with dwelling quarters upstairs. On the first floor (2 car space) are located the heavy equipment, such as calender, presses and mill. Two other rooms are also on the first floor, being used for compounding and boiler rooms.

Upstairs the five room apartment is divided as follows: two rooms for chemical work, two rooms for physical testing and one room for office and equipment storage. There is also a complete lavatory with shower bath. The building is equipped with ample electrical facilities (220 volt, 3 phase, alternating current), high and low pressure steam, hot and cold water, and gas. Movement of machinery and materials is facilitated by driveway to building and large double doors.

Equipment on Hand: To date considerable equipment has been received, although several of the basic items are still lacking. We need a tensile tester, impact tester, resin kettle, etc. to complete the laboratory. However, considering the difficulties in obtaining laboratory equipment, we consider the amount already received very good.

Research and Testing: Until we have some of the basic items, it will not be possible to embark on any extensive research programs or testing for outside companies. Already requests are coming in for assistance by companies not having these facilities and it is difficult to refuse. A study is being made whereby outside companies may make arrangements for testing or use of equipment.

The Detroit group recently agreed to furnish the project with a Scott tensile tester. Contributions of $5.00 each were asked of all of the members of the group, and it is understood that the response was quite satisfactory. The tester has already been ordered and will probably be installed in the University's laboratory shortly.

Develop New Aircraft Mounting

A new aircraft mounting designed to protect sensitive radio equipment from vibration has been developed by the U. S. Rubber Co. One of the features claimed for the new mounting is its ability to absorb vibration occurring in any of three directions, an important feature when used to mount receivers, transmitters and electronic equipment. Especially designed to meet Air Force Specifications, and known as a "flexi-compression" type, the mounting can be made an integral part of new equipment, or readily installed to replace mountings in use. The design is such that the one mounting can be used for various loads ranging from 6 to 12 pounds, thus making possible the reduction of maintenance inventories and materially speeding up the production of mountings to meet the nation's huge aircraft program.

Foamed Synthetic Rubber Latex

Goodyear Tire & Rubber Co. has perfected a method for producing foamed synthetic rubber latex for seat cushions and similar purposes. The new material is said to be comparable in most qualities to pre-war Airfoam made with natural latex and is black in color to identify it from the pre-war type which was light gray. The same wide range of densities is possible with both types of Airfoam. In most cases the synthetic Airfoam is much more highly resistant to oils, acids, gasoline and similar materials than the natural rubber product, although both types meet the R.M.A. qualifications on flex life.

To Conserve Camelback Containers

As a contribution to the conservation of containers, the Tire Accessories and Repair Materials Committee of the Rubber Manufacturers Association has adopted a program under which bulk tire repair materials will be wrapped in paper and recappers will be asked to preserve and return camelback containers so they may be reused. Individual camelback manufacturers are issuing instructions on the proper method of collapsing and returning these containers.

SCHULMAN CELEBRATES FIFTEENTH ANNIVERSARY WITH EMPLOYEE DINNER

Employees and executives of A. Schulman, Inc., scrap rubber firm with headquarters in Akron, Ohio, and branch offices and warehouses in East St. Louis and Boston, now an agent for the Rubber Reserve Co., are seen grouped around the festive board in the above photograph, the occasion being the celebration of the company's fifteenth anniversary. Since opening for business in a rented warehouse in Akron in 1928, the firm has expanded rapidly and now has a central office and factory on eight acres in the Tallmadge Avenue section of Akron. A processing plant at Conneaut, Ohio, for the preparation of hard rubber dust was recently acquired and a New York office was also opened. Officers of the firm include Alex Schulman, president; Dave Lundquist, vice-president; George Woloch, secretary and treasurer; Irving Schulman, assistant secretary; and Miss Doris Kushkin, assistant treasurer. Mr. Lundquist heads the Boston branch.

AIR CONDITIONING SYSTEM INSTALLED AT MISHAWAKA

Through the use of Ruberoid asbestos board duct work, engineers of the Carrier Corporation, Syracuse, N. Y., were able to save a total of 78,000 pounds of steel in a recent installation of ventilating and air conditioning equipment in the Mishawaka, Indiana, plant of the U. S. Rubber Co.

Carrier provided 16 heat diffusers to supply 100% outside air for spaces with high concentration of ethylene dichloride, methyl ethyl ketone, and isopropyl alcohol. The company also supplied 21 ventilating units for exhaust air purposes. Along with these there were three industrial air conditioners with cooling coils for the circulation of well water. This air conditioning equipment is for use in the processing of rubber for self-sealing airplane fuel cell tanks in connection with nylon and cement drying. As nylon is applied with paint brushes, the volatiles within it flash off causing a low surface temperature which would result in "blushing" if surrounding air was not reduced in dewpoint to a satisfactory low level around 55°.

Carrier has also supplied United States Rubber at Mishawaka with a spray washer for cooling and ventilating in connection with the processing of rubber for Army and Navy raincoats. Heating coils were installed in the same plant for use in the drying process. Because there are concentrated vapors in the room where the rubber is cemented to the fabric, Carrier was called on to provide ventilation for employee health and comfort.

Duct work, 100% as used in these installations, was made of Ruberoid asbestos board. Even the ejector nozzles in the industrial air conditioners were made out of Ruberoid instead of the usual brass.

Johnson Plant Suffers Fire

Fire which caused damage estimated at $100,000 and which laid waste some 13,000 square feet of floor space swept the plant of the Johnson Rubber Co. in Middlefield, Ohio, on August 22. A 300-foot warehouse, a small portion of the adjoining plant of the Toledo Rubber Products Co., and another building were destroyed, but the main buildings of the factory were saved by prompt action of fire departments from Middlefield and surrounding communities. The fire started in the warehouse where cartons were stored. Operations at the plant were not curtailed because of the blaze.

American Viscose Corp. is consolidating all of its basic research work at Marcus Hook, Penna., the location of one of its rayon plants and of its principal research facilities. Dr. Charles S. Venable will be director of chemical research and F. William Koster, assistant director.

CARBON BLACK NOMENCLATURE

In the July, 1943, issue of RUBBER AGE we published the names and symbols of various types of blacks as well as a table of Carbon Black Nomenclature listing brand names by producers. This nomenclature was agreed upon by a special committee appointed by the Research Compounding Branch of the Office of the Rubber Director and was headed by Dr. W. B. Wiegand, director of research of the Columbian Carbon Co. The brand names were supplied by the producers as representing how their materials fitted into the system of nomenclature.

Our attention has been called to the fact that several brand names were omitted from the first published table, and accordingly we are reproducing herewith the nomenclature symbols and a revised table of commercial products. It should be made clear that the inclusion of any brand name under any classification is not done by the Office of the Rubber Director but is the evaluation by the producer of the type of black covered by his brand name.

Name	*Symbol*
Conductive Channel	CC
Hard Processing Channel	HPC
Medium Processing Channel	MPC
Easy Processing Channel	EPC
Conductive Furnace	CF
Fine Furnace	FF
High Modulus Furnace	HMF
Semi-Reinforcing Furnace	SRF
Fine Thermal	FT
Medium Thermal	MT

BRAND NAMES BY PRODUCERS

Symbol	*Brand Names*	*Producers*
HPC	Atlantic No. 98	Johnson
	Continental F	Continental
	HX	Huber
	Kosmobile S	United Carbon
	Micronex Mx II	Columbian Carbon
	Spheron No. 4	Cabot
	Supreme SH	Imperial Oil
	Witco No. 6	Wishnick-Tumpeer
MPC	Atlantic No. 109	Johnson
	Hi-Tear Micronex	Columbian Carbon
	Continental A	Continental
	Kosmobile	United Carbon
	Spheron No. 6	Cabot
	Standard Micronex	Columbian Carbon
	Supreme MM	Imperial Oil
	TX	Huber
	Ultra Micronex	Columbian Carbon
	Witco No. 1	Wishnick-Tumpeer
EPC	Atlantic No. E-42	Johnson
	Continental AA	Continental
	Kosmobile 77	United Carbon
	Micronex W-6	Columbian Carbon
	Spheron No. 9	Cabot
	Supreme VF	Imperial Oil
	Witco No. 12	Wishnick-Tumpeer
	Wyex	Huber
CF	FB200	Huber
	Statex A	Columbian Carbon
	(*)	United Carbon
FF	Statex B	Columbian Carbon
HMF	Kosmos 40	United Carbon
	Philblack	Phillips
	Statex 93	Columbian Carbon
SRF	Essex	Huber
	Furnex	Columbian Carbon
	Gastex	General Atlas
	Kosmos 20	United Carbon
	Sterling	Cabot
FT	P-33	Thermatomic
MT	Shell Carbon	Shell
	Thermax	Thermatomic
	Velvetex	Columbian Carbon

* To be announced later.

CHANCERY COURT OVERRULES FISK DEMURRER APPLICATION

A demurrer of the dissolved Fisk Rubber Corporation which sought to prevent the appointment of a receiver at the request of two minority stockholders was overruled last month by Chancellor W. W. Harrington of the Chancery Court in Wilmington, Delaware. In the course of his opinion Chancellor Harrington said that "it appears that prior to the dissolution of the corporation a fraud was perpetrated on it by its directors and others."

The action for the appointment of a receiver was brought May 6, by Janice Levin and Benjamin W. Cohen, holders together of 75 shares of common stock with a par value of one dollar a share. They alleged that the directors of the corporation had conspired to sell certain valuable patents to United States Rubber Co. at their book value of one dollar each and to the profit of the directors.

The original petition before the Chancellor named 10 directors of Fisk at the time of its dissolution in the spring of 1940 and listed among the chief assets letters patent of the United States owned by the corporation as assignee covering inventions establishing improved methods and apparatus for "calendering sheets of rubber and cords with a single unvulcanized sheet in which the rubber entirely surrounded the parallel cords arranged in its central plane and known as Cord Tire Fabric."

To Cover Accident Prevention

The National Safety Congress to be held in Chicago on October 5, 6 and 7, under the auspices of the National Safety Council, will mark one of the most important milestones in the entire history of the accident prevention movement. Last year's Congress started the machinery of the nation-wide drive to save manpower for warpower. With that campaign in high gear, this year's program, it has been announced, will be devoted exclusively to accident problems which have a direct bearing on prosecution of the war and winning it. Cutting across interest in all sections will be many subject sessions, covering problems that confront all industries.

Sells Canada Wire Holdings

According to reliable reports in financial circles, the General Cable Corporation has sold its holdings in the Canada Wire & Cable Co., Ltd., of Leaside, Ontario, Canada. The move was reported to be part of a program to reorganize the capital structure of the American firm. As of December 31, 1942, the holdings of the company in Canada Wire were listed as 61,023 shares of Class B common stock. There were, at that date, 150,664 shares of this issue outstanding, each one carrying one vote.

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AND RESILIENCE
IN IDEAL SRF
COMBINATION

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Photographs developed in the Research Laboratories of Columbian Carbon Co.

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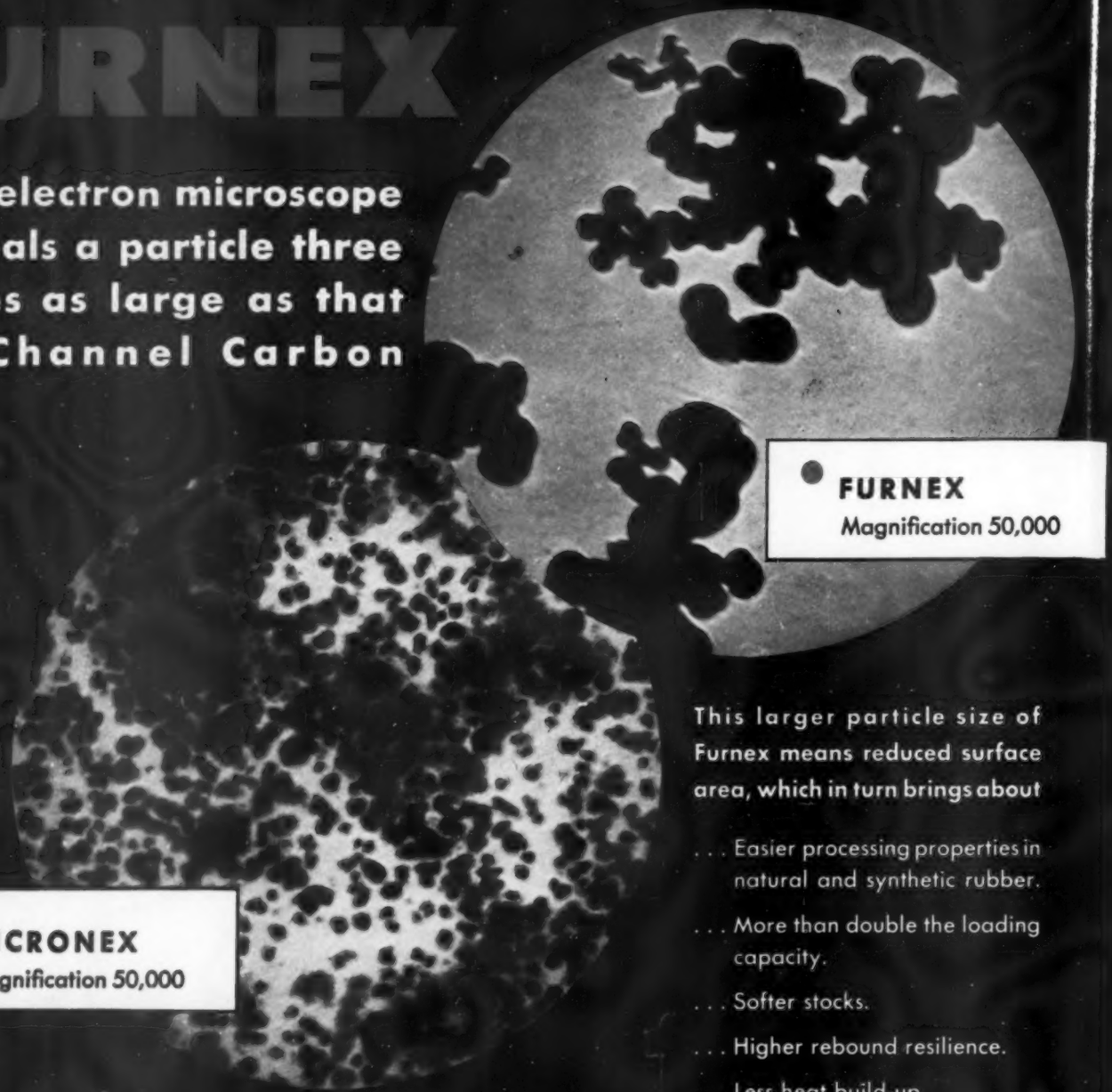
The electron microscope reveals a particle three times as large as that of Channel Carbon



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. . . Easier processing properties in natural and synthetic rubber.

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. . . Softer stocks.

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GOLF TOURNAMENT FEATURES CHICAGO'S ANNUAL OUTING

Approximately 100 members and guests attended the annual summer outing of the Chicago Group, Rubber Division, A.C.S., held at the Nordic Hills Country Club, in Itasca, Illinois, on August 14. A golf tournament, participated in by the majority of those attending, featured the outing. The Charles Muehlstein Trophy, donated by H. Muehlstein & Co., Inc., for low gross score, was won by J. T. Adams, of Sears, Roebuck & Co., who having won it for two years in a row now retains permanent possession of it.

Although golf was the feature attraction, the game room of the club proved to be a popular spot, while other members and guests disported themselves on the expansive lawn in various ways. An excellent dinner topped off the day's activities, marked by the distribution of prizes to winners in the golf and other contests. James Sheridan (N. J. Zinc) and Charles Wonder (Van Cleef Bros.) acted as chairman and co-chairman of the outing committee, respectively, and were assisted by Calvin Yoran (Wishnick-Tumpeer), Richard Huizenga (Inland Rubber), and E. L. Stangor (Chicago Belting). Prizes were made possible by generous donations from the following concerns:

L. Albert & Son, American Zinc Sales Co., Bibb Mfg. Co., Binney & Smith Co., Carter Bell Mfg. Co., Chicago Belting Co., Chicago Cutting Die Co., Cleveland Liner & Mfg Co., Commerce Petroleum Co., Continental Carbon Co., Darling Co., T. A. Desmond & Co., DuPont, Eagle-Picher Lead Co., Farrel-Birmingham Co., General Atlas Carbon, George Genseke, Givaudan - Delawanna, Inc., Godfrey L. Cabot, Inc., Great Lakes Solvent Corp., R. W. Greef & Co., C. P. Hall Co., Herron & Meyer, J. M. Huber, Inc., Hycar Chemical Co., *India Rubber World*, International Smelting & Refining Co.

S. C. Johnson & Sons, Kraft Chemical Co., Marbon Corp., G. S. Mepham Co., Monsanto Chemical Co., Moore & Munger, J. Raymond Morath, H. Muehlstein & Co., National Rubber Machinery Co., National Standard Co., N. J. Zinc Co., Pequanoc Rubber Co., Philadelphia Rubber Works, Rex-Hide Co., RUBBER AGE, A. Schulman, Inc., Henry L. Scott Co., Stanco Distributors, Inc., Standard Chemical Co., Sun Oil Co., Thiokol Corp., Titanium Pigment Corp., United Carbon Co., U. S. Rubber Reclaiming Co., R. T. Vanderbilt Co., Wilmington Chemical Corp., Wishnick-Tumpeer, Inc., Xylos Rubber Co.

National Safety Council, Chicago, has issued its 1944 Safety Calendar under the theme "Safety—Yesterday and Today." The Council urges that manufacturers make the new calendar an integral part of their 1944 accident prevention programs.

Self-Sealing Fuel Tanks

Glass cloth woven from yarns manufactured by the Owens-Corning Fiberglas Corp. is now being used in the self-sealing gasoline tanks used on certain types of American war planes. In an attempt to avoid "flowering" of the metal, which sometimes occurs in tanks of this type, the jagged petals of the "flower" protruding into the self-sealing material of the tank, a plastic reinforced with glass cloth was placed between the metal and the tank, with good results. The combination material is said to be extremely strong, light in weight, and, unlike metal, does not "flower." The result is that a bullet striking the tank makes a clean hole, with nothing to prevent the self-sealing material from closing it.

Wood Heads Rubber Section

Dr. Lawrence A. Wood, a member of the staff of the Rubber Section of the National Bureau of Standards at Washington, D. C., for the past eight years, has been appointed chief of that section, succeeding Dr. A. T. McPherson who has been put in charge of the Bureau's Division of Organic and Fibrous Materials, of which the Rubber Section is a part.

Born in Peekskill, N. Y., in 1904, Dr. Wood was graduated from Hamilton College and later received his Ph.D. in physics from Cornell University, where he was an instructor for several years. While at Cornell he became widely known for his work in photocells, publishing eight papers in this field.

During his work with the Rubber Section of the Bureau of Standards, Dr. Wood achieved recognition as an authority on the physical constants and properties of both natural and synthetic rubber. He is the author of numerous scientific papers dealing with the optical and thermodynamic properties of rubber, the crystallization of rubber, and related subjects. His Circular No. 427 on "Synthetic Rubber," published in 1940, has been very widely circulated both in the United States and abroad. In 1938 Dr. Wood was one of two official delegates to represent this country at the Rubber Technology Conference held in London.

Dr. Wood is a member of the American Chemical Society, the American Physical Society, the Washington Academy of Sciences, the Philosophical Society of Washington, and of several honor fraternities and societies.

A new photographic service to industry, which includes the use of an ultra high-speed motion picture camera, capable of taking 3,000 pictures a second, is being offered by McLarty Business Films, 986 Ellicott St., Buffalo 8, N. Y.

PROGRAM FOR 1943 MEETING SET BY RUBBER SAFETY GROUP

The meeting of the Rubber Section of the National Safety Council, to be held at the Sherman Hotel in Chicago on Tuesday afternoon, October 5, and Wednesday morning, October 6, in conjunction with the 32nd National Safety Congress and Exposition, will feature a full program. The full Congress, which is scheduled for October 5, 6 and 7, is spread over the Sherman, Morrison and La Salle Hotels.

The Tuesday session of the Rubber Section will start at 2:00 P. M. with a report of sectional activities by John L. Grider, general chairman of the section, formerly with the American Hard Rubber Co. and now personnel manager of Gould & Eberhardt, of Newark, N. J.

Following this report, three papers will be delivered, as follows: *Safety Training in Wartime*, by John I. Yellott, chairman, Safety Training Committee, Illinois Institute of Technology; *Highlights in the Placement of Women in Industry*, by Ruth Stone, Western Electric Co.; and *Health, Service in War Plants*, by C. O. Sappington, industrial health consultant. The session will conclude with the presentation of "Women in Industry," a motion picture, with comments by Paul Van Cleef, of Van Cleef Bros., Chicago.

The election of officers for the 1943-44 season and the presentation of awards in the 1942-43 safety contest of the section will feature the Wednesday session. Outstanding facts of the contest will be discussed by J. J. Raytkwich, safety director of the Marion (Ohio) plant of the U. S. Rubber Co., while the awards will be made by J. I. Banash, consulting engineer of Chicago and a past president of the Council.

The presentation of a paper on *Mechanical Safety in Plants Manufacturing Synthetic Rubber*, by E. T. Handley, manager of production, synthetic plants, Firestone Tire & Rubber Co., and a Symposium on *Solvents for the Rubber Industry* will conclude the session.

Three papers are scheduled for the symposium: *Safe Use of Solvents*, by Leonard Greenburg, Division of Industrial Hygiene, N. Y. State Department of Labor; *Ventilating Problems*, by Bernard Offen, B. Offen & Co.; and *Dermatitis*, by W. E. Obetz, medical investigator of the Ohio Industrial Commission. Warren A. Cook, of the Zurich General Accident & Liability Insurance Co., will lead the symposium discussion.

Certain types of marine pump gears used on landing boats and formerly made of metal are now being made of synthetic rubber, according to a recent announcement by U.S. Rubber. The cutting action and wear which sand and other foreign matter formerly had on the metal gears has been eliminated due to the abrasive-resistant qualities of the rubber.

Another Rubber Replacement

A new plastic work apron that replaces those made of rubber and which protects war workers against dermatitis and other industrial hazards has been developed by John Kerr, of Montclair, N. J., a turret lathe operator employed by the Otto Aviation Corp., of Bloomfield, N. J. Mr. Kerr, who has studied plastic chemistry, is continuing his work at the Bloomfield plant but has also set up the Nu-Lite Manufacturing Co. in Verona, N. J., to produce the work aprons. According to an announcement from the Otto concern, the new apron has all the desirable qualities of rubber and weighs only one-seventh as much. It consists of "Resistite," polyvinyl butyral resin impregnated into a fabric base, and sheds water, oil, gasoline, mild acids and alkalies, as well as iodine and similar compounds.

Receives Production Citation

Eugene A. Roberts, research engineer of the Firestone Tire & Rubber Co., Akron, was given the Citation for Production Ideas, highest honor bestowed by WPB's Board of Individual Awards, last month. The citation was made for the development of a new channel tread airplane tire which "not only makes possible safe landing of military planes at high speed on rough terrain, but also saves vast quantities of rubber and quantities of other critical material by simplifying the wheels on which the new tire is mounted." Firestone's patent rights and complete specifications for making these channel tread tires have been made available to the entire rubber industry. Honorable mention was given to I. J. Sjothun, one of Robert's fellow workers, for developing the use of dust from rubber buffings for recaps and retreads.

A new plan to save 250,000 pounds of crude rubber this year has been announced by Walter Geist, president of the Allis-Chalmers Co. It calls for "wartime drives" using shorter center distances and larger sheaves on all new applications made. Mr. Geist is an inventor of the multiple V-belt drive.

Buffalo Meets September 23

A meeting of the Buffalo Group, Rubber Division, A.C.S., will be held on Thursday, September 23, in the Hotel Westbrook, Buffalo, N. Y. Dr. J. P. Grey, of the research laboratory, Airplane Division, Curtiss-Wright Corp., will speak on "Plastics in Aircraft Applications." This talk will cover the properties and characteristics required of plastics in the aviation industry and will treat critically of their limitations, indicating the necessity for other materials with the required properties. Before joining Curtiss-Wright, Dr. Grey was with the Durez Plastics & Chemical Co.

Factory Personnel Shifted

Several shifts in factory personnel were recently announced by the U. S. Rubber Company. Curtis L. Moody, factory manager of the Dominion Rubber Co., Ltd., Kitchener, Ontario, has been named production manager of the company's tire division with headquarters at Detroit. He succeeds R. Y. Copland who joins the central engineering department. James A. Daly, production manager of the Detroit plant, becomes factory manager of that plant, succeeding George R. McNear, who has been appointed Pacific Coast sales manager of the tire division, with headquarters at Los Angeles. John M. Miller, formerly factory manager of the munitions plant operated by U. S. Rubber for the government at Marion, Ohio, is now factory manager at Los Angeles, succeeding C. L. Remy who has been transferred to Detroit on special assignment. Thomas E. Clark, factory manager of the government-owned and company-operated shell loading plant at Charlotte, N. C., and previously factory manager at Indianapolis, is now factory manager of the Fisk plant at Chicopee Falls, succeeding C. E. Maynard, resigned. J. E. Cady, who was development manager at Indianapolis, is now factory manager of that plant. John Grennor, who started with the Fisk company more than 25 years ago, has been promoted to the position of assistant factory manager at Chicopee Falls.

Life Raft Repair Kits

Thousands of life rafts leaving the plants of the Firestone Tire & Rubber Co. are now equipped with a special repair kit, consisting of a newly-developed type of cement and synthetic rubber patches. The technique is to apply the cement with a small brush, which also serves as the top of the bottle holding the cement. Above or below the water line, the cement retains its sticking qualities and does not lose strength by being diluted with water. Once the cement has been applied to the damaged part of the raft the patch is immediately stuck on over the cement. Several reports of the failure of patches previously in use to effectively seal punctured rubberized rafts led to the development of the special type by Firestone.

Anaconda Loses Discharge Plea

On September 9, Federal Judge John P. Hartigan of Providence, R. I., denied motions to discharge indictments against the Anaconda Wire & Cable Co. and five individuals on charges of selling defective wire to the Army Signal Corps and the British War Ministry. The indictment, which covers eight counts, was returned last January. Judge Hartigan ruled, however, that the charge that the defendants "knew that a majority of all wire and cable produced would not be made of the quality called for and that it would endanger the lives of men in the military service of the United States" be withdrawn from the consideration of the jury.

Increase Pliofilm Production

As a result of greatly-increased war uses for Pliofilm, including its use as an overall "raincoat" for shipment of fighting planes, the Goodyear Tire & Rubber Co. has resumed production of this moisture-proof material at its plant in St. Marys, Ohio. In addition, it is stated, production is also being increased 10% in the Akron plants due to improvements in processes. Two units at St. Marys are already back in production and the third one will resume on November 1.

C. L. Moody
Tire Production Manager

J. A. Daly
Factory Manager, Detroit

J. M. Miller
Factory Manager, Los Angeles

T. E. Clark
Factory Manager, Fisk

Going to the
RUBBER DIVISION (ACS)
Meeting in New York?

TIME AND PLACE—

The meetings will be held in the Main Ball Room of the Hotel Commodore, Lexington Avenue at 42nd St., New York City on Tuesday, Wednesday and Thursday, October 5, 6, 7.

TRANSPORTATION—

If you have not already done so, get your railroad tickets now.

HOTEL—

Arrange immediately for your hotel reservations. Write directly to the Hotel Commodore or to the hotel of your choice.

REGISTRATION—

It will be of great help to the Registration Committee if a large number of those who plan to attend the meetings will *register in advance.* Just fill in, tear out and mail the blank below. Upon arrival all you do is pay your fee and obtain your lapel badge. *Do not send your registration fee in advance.*

BANQUET—

The banquet will be held on Wednesday, October 6 at 6:30 P.M. in the main Ball Room of the Commodore. The tickets are $4.00 each. As the hotel management requires to know 24 hours in advance the exact number of dinners to be served, *no tickets will be sold after 6:00 P.M. on Tuesday, Oct. 5.* Tickets will be on sale at the Registration Desk in the Lobby of the Main Ball Room all day Tuesday. If you do not plan on attending the meeting on the first day, either arrange for someone to purchase a ticket for you, or send your check now to Charles R. Haynes along with the Registration Blank below.

Fill in and mail this blank to:

Charles R. Haynes,
c/o Binney & Smith Co.
41 East 42nd Street,
New York 17, N. Y.

NOTE:

If additional copies of this blank are required, write to RUBBER AGE, 250 West 57th St., New York 19, N. Y.

Division of Rubber Chemistry—American Chemical Society
October 5, 6, 7, 1943—Hotel Commodore, N. Y. City

ADVANCE REGISTRATION CARD

Print Name _____
Last First Middle

Company _____

Address _____

Name of Hotel in New York _____

Member of American Chemical Society? Yes ☐ No ☐

The Foregoing Is Correct:
Sign Here: _____

FOR BANQUET TICKETS

Enclosed please find check for $ _____ for which send me _____ tickets @ $4.00 each for the Banquet to be held on Wednesday evening, October 6, 1943.

Inspector's Approval

_____

Registration Fee

A.C.S. Member . . . $1.00
All Others 2.00

NAMES IN THE NEWS

Ross E. Wilson, chief engineer of the Liberian plantation of the Firestone Tire & Rubber Co., has been advanced to the position of general manager of the company's plantation division. He has been associated with the Liberian development since its inception.

Ward Delaney, associated with textile chemistry for many years, has been elected executive director of the recently-organized Institute of Textile Technology, formed by operators of 29 cotton mills to engage in fundamental and applied research in cotton textiles.

Amos E. Taylor, associated with the Bureau of Foreign & Domestic Commerce since November, 1930, has been nominated as director of that Bureau. He has written extensively for economic and scientific journals.

Howard W. Weber, associated with the sales department of the U. S. Rubber Co. since 1934, has been appointed sales manager of the wire and cable department of the company. He is a graduate of Lehigh University.

Lieut. Col. Max F. Moyer, former assistant manager of the rubber flooring department of the Goodyear Tire & Rubber Co., has been promoted to the rank of colonel. Col. Moyer served in the aviation section of the Signal Corps in the last war and re-entered the service in May, 1942.

Julian M. Avery, director of the research and development laboratory at the main plant of the Diamond Alkali Co. in Painesville, Ohio, since 1941, has been elected a vice-president of the company in charge of research and development. He was formerly connected with Arthur D. Little, Inc.

Harold S. Liddick, for the past 12 years chief chemist and factory superintendent of the Davidson Rubber Co., Boston, is now with the Sponge Rubber Products Co. as factory manager of the Derby, Conn., plant.

Pierce Sperry, vice-president and sales manager of the Johnson Rubber Co., Middlefield, Ohio, has been appointed to head the third war loan drive in Geauga County, Ohio.

F. V. Larkin, formerly associated with the Windsor Manufacturing Co., Goodyear subsidiary at Windsor, Vermont, and more recently connected with the Pennsylvania Rubber Co., has joined the Hard Rubber Division of the Hood Rubber Co. at Watertown, Mass.

John E. Caskey, formerly assistant general manager of the Naugatuck Chemical Division of U. S. Rubber Co., and until recently general manager of the Explosives Division at the Pennsylvania Ordnance Works plant of the company, has been made manager of the Charlotte (N.C.) plant, also operated by the company.

Leslie Carver, associated with the Buffalo (N.Y.) plant of the General Cable Corp. for the past few years, is now technical superintendent of the plant operated by the company in St. Louis, Mo.

F. P. "Larry" Hartung, associated with the Ohio Rubber Co. for the past ten years in production engineering and development, and prior to that with the B. F. Goodrich Co. for some twenty years, has been named factory manager of the Virginia Rubatex Division of Great American Industries, Inc., at Bedford, Virginia.

Lt. Ralph V. Guinzburg, Jr., son of the president of the I. B. Kleinert Rubber Co., has been awarded the Purple Heart and the Air Medal and has been recommended for the Silver Star for saving fellow flyers, although wounded himself, when his B-17 Fortress was shot down over the British Channel last July.

Walter J. Murphy, editor of *Industrial Engineering & Chemistry*, has been appointed a member of the Division of Chemistry and Chemical Technology of the National Research Council for a three-year term.

A. E. Jury, formerly agent of the Winnsboro, S. C., Mills of the U. S. Rubber Co., was recently named factory manager of the company's synthetic rubber plant in Los Angeles. He has been with the company since 1915.

Cyrus S. Ching, director of industrial and public relations of the U. S. Rubber Co., has resigned as an employer member of the National War Labor Board and has returned to his duties with the company. He has been in Washington for over two years.

Michel Polli, who went to Brazil in January, 1942, as an employee of the Rubber Development Corp., has been reported missing and probably lost following a launch accident on the Paraguay River near Corumba, Brazil. Prior to joining Rubber Reserve, he had spent two years on the Firestone plantations in Liberia.

Herbert E. Smith, chairman of the board, U. S. Rubber Co., and Herman Muhelstein, president, H. Muehlstein & Co., Inc., have accepted appointments as chairman and vice-chairman, respectively, of the rubber group of the New York Committee of the National War Fund.

Dr. Arnold Belchetz, associated with the Shell Oil group and the M. W. Kellogg Co. for the past 15 years, has been named director of research and development for the Stauffer Chemical Co.

P. W. Litchfield, chairman of the board of the Goodyear Tire & Rubber Co., has been named a member of the committee on utilization of war plants and surplus property, recently formed by the United States Chamber of Commerce. The committee is charged with problems of wartime inflation and postwar deflation of real estate.

Joseph Garcia, an employee of the Goodyear Aircraft Corp., Akron, and former deputy sheriff of Summit (Ohio) County, has accepted an appointment with the Rubber Reserve Co., which will take him on a roving assignment throughout Latin America.

Charles T. Jansen, statistical director of the Rubber Manufacturers Association, and connected with that Association for more than 10 years, will shortly join the Wilmington Chemical Corp., 10 East 40th St., New York City, as an assistant to Edward V. Osberg, vice-president.

Sidney C. Moody, associated with the Calco Chemical Division of the American Cyanamid Co. since 1919, has been appointed assistant general manager in charge of all departments of the Division.

Capt. Samuel Poor, Jr., son of the vice-president of the General Tire & Rubber Co., has been reported killed in action in the South Pacific. He was a member of the Army Air Corps and had worked himself up the ranks from buck private to captain.

Paul Mayfield, director of sales of the naval stores department of the Hercules Powder Co., Wilmington, Delaware, has been named assistant general manager of that department. He has been with the company since 1926.

Dr. William S. Calcott, director of the Jackson Laboratory of E. I. duPont de Nemours & Co., Inc., since 1931, has been appointed assistant chemical director in charge of development of the company's Organic Chemicals Department. He will make his headquarters in Wilmington.

BACK THE ATTACK
BUY MORE WAR BONDS NOW

A.S.T.M. RUBBER COMMITTEE CONTINUES DEVELOPMENT WORK

The various sub-committees of Committee D-11 on Rubber Products of the American Society for Testing Materials are continuing their respective development work and several actions on specifications and tests are imminent.

The work of Technical Committee A on Automotive Rubber, which operates under the joint auspices of A.S.T.M. and S.A.E., continues with the drafting of two purchase specifications covering coolant system hose for use in combat tank applications where the service is severe and the hose must withstand pressure, various types of coolant liquids, both hot and cold temperatures, and unskilled application to fittings.

The other specification is for an all-reclaim non-combat vehicle radiator hose which is only suitable for less severe service and which should not be used except when fully approved by both producer and consumer.

The drafting of sponge rubber and sponge rubber products specifications also continues, involving chemically blown sponge rubber, foamed latex sponge rubber, and closed cell type of sponge rubber. Proposed standards are being circulated among interested parties.

The sub-committee on rubber-coated fabrics has prepared a preliminary draft covering a group of test methods which will form the nucleus of a tentative standard on fabrics coated with rubber or rubber-like materials. It is hoped to have this ready for presentation to the parent committee and to the Society in the very near future.

Ling Joins Naugatuck Chemical

Howard G. Ling, recently associated with H. Muehlstein & Co., Inc., and previously connected with the Goodyear Tire & Rubber Co. and the Mid-West Rubber Reclaiming Co., has joined the Chemical Sales Staff of the Naugatuck Chemical Division of U. S. Rubber Co. Graduated from Michigan State College in 1926, Mr. Ling went directly into the rubber industry and brings a broad experience in compounding rubber and synthetics to his new work. He will represent Naugatuck Chemical in the Eastern territory, with headquarters in New York.

Fire at Hohwieler Rubber Co.

A fire of suspicious origin broke out at the plant of the Hohwieler Rubber Company in Morrisville, Penna., on August 16. According to William U. Hohwieler, owner of the company, some $2,500 damage was done to tools and office records. No one was in the plant at the time of the fire, the details of which have been reported to the War and Navy Department. The plant is currently engaged in making specialized products for the Army and the Navy, including rubber dummies used for testing parachutes.

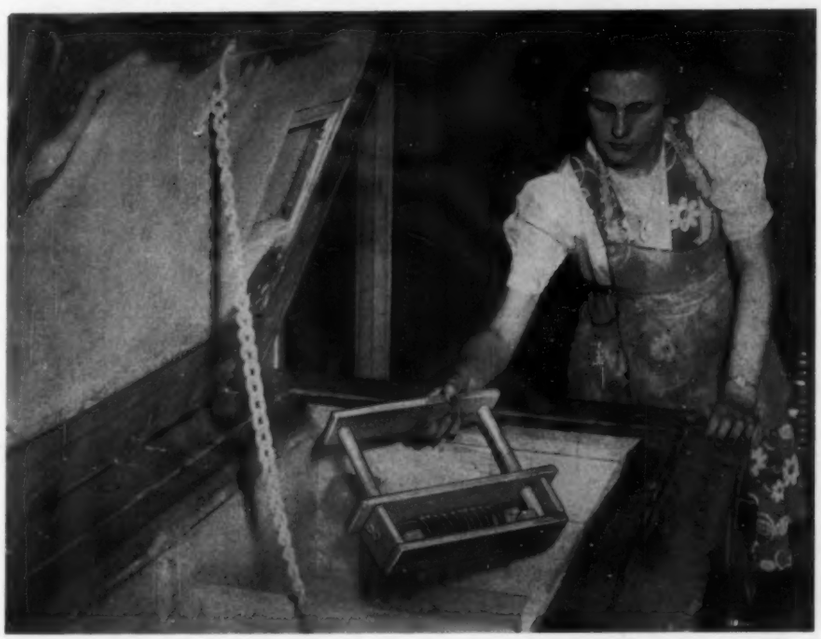
New Anti-Icing Device

A new and novel method of preventing the formation of ice on propeller blades of aircraft has been announced by the U. S. Rubber Co. Developed by Dr. Louis Marick of the company's development division at Detroit with the cooperation of the engineering staff at Wright Field, the device is made possible by the use of Uskon, the conducting rubber recently announced by the company. A strip of this conducting rubber is attached to the leading edge of each propeller blade. The passage of electricity through the material heats the edge sufficiently to keep ice from forming, said to be an advantage over methods of deicing which function after the ice has already been formed. Test flights using the new anti-icing device have been conducted by the staff at Wright Field. The National Advisory Committee for Aeronautics is also engaged in a study of anti-icing problems and will carry on experimentation with the conductive rubber unit. The principle used in the new device is expected to be applied to other anti-icing problems in military and civilian aircraft.

Bulletin on Carbon Black

A bulletin on Carbon Black in GR-S, representing a practical summary of the unpublished work of B. S. Garvey, Jr., and J. A. Freese, Jr., of the B. F. Goodrich Co., has been issued by the Educational Committee of the Office of the Rubber Director. The bulletin is an outgrowth of the article by the Goodrich research workers which appeared in the November, 1942, issue of *Industrial & Engineering Chemistry* under the title of "Effect of Carbon Blacks in Synthetic Rubber Compounds." After the publication of this paper, the authors continued their work, adding other kinds of black, and in March, 1943, prepared a further report of over 350 pages entitled "A Survey Study of Carbon Blacks in GR-S." In order that the entire rubber industry might have the benefit of this comprehensive work, the Educational Committee of the Office of the Rubber Director, with the advice and detailed help of the authors, undertook to edit, condense and summarize it, redrawing the numerous graphs. It is this summary which has been issued in bulletin form and made available by the ORD.

HYCAR LOW-TEMPERATURE PRODUCTS TESTED IN SPECIAL REFRIGERATED UNIT



Samples of Hycar intended for low-temperature performance, such as those used in high altitude flying where the mercury often drops to —65° F. or lower, are tested in a specially constructed refrigerator in the laboratory of the producer, the Hycar Chemical Co., of Akron. In this test, conditions much more severe than those the finished product would ever encounter in actual use are produced. The special cabinet, reproduced above, is insulated with 8 inches of cork board and refrigerated with dry ice. A fan operating from external motors circulates chilled air through controlled louvres to regulate temperature which can be lowered to —100° F. if desired. All tests, such as durometer hardness, low temperature flexibility, and brittle point, are made by means of external mechanisms, thus avoiding the possibility of interjecting error into the test if the sample was removed from the cabinet or if the cabinet was opened.

FINANCIAL NEWS

GOODYEAR PROFIT LARGER BASED ON INCREASED SALES

Goodyear Tire & Rubber Co. reports net profit of $7,348,529, equal to 2% on greatly expanded net sales or $2.82 per share of outstanding stock, for the first six months of 1943. This compares with $4,123,961, or $1.24 per share, reported for the first six months of the previous year.

Net sales increased from $179,755,599 in the 1942 period to $366,269,545 in the 1943 period, a gain of 103%. Taxes for the current period were three and a half times larger than those last year.

Charges against the net profit, which is subject to audit and renegotiation proceedings, amounted to $7,999,612, of which $2,500,000 was a provision for post-war rehabilitation of plant and equipment, $2,499,612 for post-war property adjustment, and $3,000,000 for contingencies.

The net profit for the first half of 1942 was after provision of $6,751,247 for losses in the Far East and $1,500,000 for contingencies. Federal income and excess profits taxes for the 1943 period amounted to $40,643,051, against $10,000,000 provided for taxes in the first six months of last year.

Goodyear's investments in enemy-occupied countries were fully reserved for in prior years and were not, therefore included in the balance sheet, which shows net working capital on June 30 as $130,940,387, compared with $111,890,781 a year earlier.

GOODRICH EARNS $5,573,879 FOR FIRST HALF OF 1943

Consolidated net profit for the first six months of 1943 is reported by the B. F. Goodrich Co. at $5,573,879, equal after preferred dividend requirements to $3.49 a share on the common stock, or more than double the $1.59 a common share earned in the corresponding period of 1942 based on net profit of $3,103,087.

The 1943 period profit was after all charges, including provision of $30,773,000 for domestic and foreign income and excess profits taxes and $4,000,000 for contingencies of all kinds. The 1942 profit was after provision of $14,068,000 for taxes and $1,000,000 for contingencies.

Consolidated net sales for the first half of 1943 amounted to $179,161,773, an increase of 73.4% over the $103,283,542 reported in the 1942 period. The sales figures do not include the value of the output of government-owned and financed plants operated by the company. Current assets as of June 30, 1943, were listed at $125,522,097 against current liabilities of $44,655,566, a ratio of 2.8 to 1. Net working capital increased $5,385,606 during the period.

The report also revealed that a "regulation loan" was entered into on June 14, 1943, with various financial institutions permitting the company during the period ending August 31, 1946, to borrow up to $50,000,000 to finance war business. Renegotiation of war contract prices has been completed with respect to the year of 1942. The contingency reserve provided in the 1942 profit-and-loss account, however, was sufficient to absorb the net effect of such renegotiation.

Columbian Carbon Co.

First Half: Consolidated net earnings, after provision of $839,500 for Federal income taxes, amounted to $1,502,365, equal to $2.80 per share, which compares with $1,546,156, or $2.88 a share, for the first half of the previous year. No allowance was made for the effect of possible renegotiation. Consolidated current assets, as of June 30, totaled $11,077,690, of which $6,476,364 consisted of cash and marketable securities, and current liabilities of $2,921,040.

United Carbon Company

First Half: Net profit of $947,602, equal to $2.38 a share on the common stock, after taxes and charges, which compares with $920,990, or $2.31 a common share, in the first six months of 1942. Taxes, both normal and excess profits, were estimated at $696,000. Surplus increased from $4,142,934 on January 1, 1943, to $4,493,708 on June 30. Total current assets as of June 30 were listed at $5,397,605 against total current liabilities of $1,680,025.

Belden Manufacturing Co.

First Half: Net income of $246,762, equal to $1.02 a share, which compares with $247,722, or $1.03 a share, reported for the first half of last year. Net sales for the 1943 period amounted to $5,597,881.

Master Tire & Rubber Corp.

First Half: Net income of $158,742, which compares with $64,331 last year. The company is reported to be steadily increasing its earning capacity, based on improved sales.

Anaconda Wire & Cable Co.

First Half: Net income of $468,431, after taxes and contingencies, equal to $1.11 per capital share, which compares with $865,043, or $2.05 a share, reported for the first six months of last year.

New Jersey Zinc Co.

First Half: Net profit of $3,449,276, equal to $1.75 a share, which compares with $4,444,318, or $2.26 a share in 1942. Net profit for the second quarter of 1943 amounted to $1,712,785, or 87c a share, against $2,152,984, or $1.09 a share, in the corresponding quarter of the previous year.

Garlock Packing Co.

First Half: Net income, subject to renegotiation, and after $1,175,961 provision for United States and Canadian income and excess profits taxes less post-war refund and debt retirement credits, and a $110,000 reserve for contingencies, amounted to $450,368, equal to $2.15 a share.

Baldwin Rubber Co.

Year Ended June 30: Net profit of $310,296, after provision of $556,623 for Federal income and excess profits taxes and reserve of $50,000 for post-war plant rearrangements, equal to 98 cents a share. This compares with $316,040, or $1.00 a share, after $144,290 taxes, reported for the previous fiscal year.

Raybestos-Manhattan, Inc.

First Half: Net profit, reflecting post-war refund of $308,000 and after $375,000 provision for post-war adjustments and other contingencies, amounted to $811,525, equal to $1.29 a share, which compares with $867,157, or $1.38 a share, in the corresponding period of 1942.

Monsanto Chemical Co.

First Half: Net profit of $2,869,349, after provision of $5,771,767 for Federal income and excess profits taxes, equal to $1.95 a share on the common stock, which compares with $2,133,765, or $1.37 a share, in the first six months of 1942.

Philadelphia Insulated Wire Co.

First Half: Net profit of $30,143, which compares with a net loss of $1,917 reported for the first six months of the previous year which, in turn, contrasted with a net profit of $23,154 in 1941.

Plan Fourth Chemurgic Meeting

The Fourth Mid-American Chemurgic Conference, under the auspices of the National Farm Chemurgic Council, Inc., will be held at the Hotel Gibson, Cincinnati, Ohio, on September 29 and 30. Three general sessions are scheduled, and will include a paper on "Rubber from Soybeans," by Andrew J. Snyder of Reichhold Chemicals, Inc., and a progress report on alcohol by Dr. A. J. Liebman of the Schenley Research Institute.

LOS ANGELES NEWS

The Latex Seamless Products Company, 4620 E. Washington Boulevard, and the Golden State Rubber Mills, 657 E. 61st Street, have consolidated as of September 1, the names of the two firms being retained as formerly.

Carl E. Stentz, who established the Latex Seamless Products Company a few years ago and who has been its proprietor ever since, is vice-president and general manager of the new set up. Earl C. Stentz, father of Carl E. Stentz, who has been acting as plant manager at the Latex Seamless Products Company for two years, remains in that capacity, with Jack Mergell as factory superintendent. This plant is producing dipped rubber products.

The Golden State Rubber Mills is producing extruded and molded goods and the facilities are being enlarged for the manufacture of these products. Don Spore is general plant superintendent. Emmett Long, who has been general manager of the Golden State Rubber Mills, has retired from business because of his health.

The consolidation is one of the most important events to occur among the medium-sized factories in Los Angeles in some time.

A large number of the members of the Los Angeles Rubber Group are slated at this writing to attend the national gathering of the American Chemical Society in New York early in October. Reservations have been made to permit all the delegates to travel on the same train.

The American Rubber Manufacturing Company, located at Park Avenue and Watts Street, Oakland, has recently increased the size of its plant and laboratories. N. C. Dodge is the proprietor.

Word has reached Los Angeles of the marriage of Dick Newell, formerly plant superintendent for the Rubbercraft Corporation of California, now vice-president of the Universal Rubber Corporation, San Francisco. Further details for the moment are not available, but every friend of Dick's in the Los Angeles Rubber Group is sending heartiest congratulations.

That one-day summer outing of the Northern California Rubber Group, the first annual outing, turned out even better than expected, for it drew an attendance of 120 people at the Hearst ranch near Dublin, suburb near Oakland. The wives and families of the group members attended and the day was a very pleasant one for all concerned, so the story goes.

C. A. Carlton, of the J. M. Huber Co., Inc., Borger, Texas, is scheduled for a Los Angeles business visit early in October.

Mrs. M. J. Perkins, better known as "Scofield," who has been in the office of the Union Rubber Company almost since the founding of that concern, has recently spent time in a hospital undergoing surgery but is reported as much better at this writing.

Standard Rubber, Inc., is rushing its new factory building and plant toward rapid completion at Compton and Gage Avenues. The new building, mentioned last month, adds some 16,000 square feet of floor space to the factory.

Volatile fumes collecting in a drain pipe under a rubber-treating fabric machine exploded and injured eight people at the B. F. Goodrich Company factory, 5400 East Olympic Boulevard. W. E. Head, general manager, said that none of the equipment was permanently damaged.

Following the explosion the materials caught fire enveloping the machinery in flames. Heavy steel plates covering a run-off drain were blown off. The injured were taken to the Good Samaritan Hospital nearby. Windows buckled from the explosion and flying glass was responsible for some of the injuries the workmen received.

The Goodyear plant has the distinction of having three generations all at work at the same time. The youngest, Viola Richards, is employed in the tank repair department; her mother, Mrs. Guennie Lumley, is employed in the mechanical goods department; and Mrs. Norma Thomas, the grandmother, is employed in the tank repair department.

The first supper meeting of the year will be held at the Mayfair Hotel, the usual place of meeting, by the Los Angeles Rubber Group, on Tuesday evening, October 5. The chairman, C. J. Roese, will act as chairman for the remainder of the calendar year. As has been the custom for many years the group has not held supper meetings during the summer (July, August, and September) and a meeting will not be held in January. The attendance last year was very encouraging in spite of war conditions and it is generally expected that such attendance will be maintained this year also.

A maintenance handbook telling how to keep motors and generators operating continuously at peak efficiency without dismantling is offered by the Ideal Commutator Dresser Co., Sycamore, Illinois.

Improved Seaboot for Navy

An improved seaboot that will provide both warmth and waterproof protection and which will help protect men on watch on slippery decks of submarines has been announced by the Navy. Developed by the U. S. Rubber Co., working closely with the Research and Development Section of the Clothing Division of the Navy Bureau of Supplies and Accounts, the seaboot is now in production at the Naugatuck, Conn., plant. The new seaboot is wide and roomy and is designed to accommodate thick felt insoles, felt duffle socks, a heavy pair of wool socks and two pairs of heavy stockings. It also has special safety features such as a cleated heel, over ½ inch thick, for safety in traveling up and down submarine ladders and a non-skid Sperry Top-Sider sole for sure grip and greater safety on slippery decks. Hundreds of pairs of the new boots have already been delivered for use by men working on submarines in cold climates. When submarines surface, the seaboots will protect feet and legs of men who stand on watch against both cold and wet. Additional seaboots will later be delivered for men on other deck duty.

To Manufacture Resiliometer

Precision Scientific Co., 1750 North Springfield Ave., Chicago, 47, Ill., has acquired the sole manufacturing rights for the Bashore Resiliometer, formerly manufactured and sold by the Testing Equipment Co., of Manheim, Penna. The instrument, developed by Homer H. Bashore, measures the resiliency of rubber and extensible plastic compounds by indicating the rebound of a weighted plunger dropped from a predetermined height. It has been found useful in the development of rubber compounds for measuring rate and state of cure, for matching competitive compounds, for factory control tests on cured samples of mixed batches and on uncured samples of masterbatches, for comparing heat build-up of various compounds, and for measuring the plasticity of uncured compounds and masticated rubber.

ADDITIONAL DETAILS GIVEN OF LOS ANGELES 1943 OUTING

Additional details concerning the successful two-day outing held by the Los Angeles Group, Rubber Division, A.C.S., at the Uplifters Club in Santa Monica on Saturday and Sunday, July 24 and 25, have been received. As previously reported, approximately 85 members and guests attended the outing which featured a breakfast talk by Joe E. Brown, popular movie star, on Sunday morning, July 25.

That the members and guests attending the outing were kept busy practically throughout the entire two days is indicated by the numerous events and contests held. Winners in some of these events, all of whom received valuable and novel prizes, included the following:

Best Dressed '49er: L. Jung (U. S. Rubber), Vic Vodra (Vanderbilt); *Bingo:* Sid Pike (Desmond), Cliff Lucas (Rubber Reserve), Art Swanson (Voit Rubber); *Ping Pong:* B. Snyder (Voit Rubber), Bob Hirsch, Russell Hull (U. S. Rubber); *Golf:* W. Von der Reith (Sierra Rubber), John Huff (U. S. Rubber), Cliff Lucas, Lombard Smith; *Tennis:* Mr. Bradford, H. Wendall (Southwestern Rubber), Phil Drew (Goodyear); *Badminton:* Bob Short (Kirkhill Rubber), Vic Vodra, A. S. DeWeese (Voit Rubber); *Horseshoes:* Curtis Wolters (U. S. Rubber), Page Parker (Voit Rubber), Whitey Ketler (Voit Rubber); *Guessing Contest:* J. Gimian, J. Wildman (Commercial Rubber), A. Legman; *Egg Throwing Contest:* Walter Boswell (Thiokol), H. Legman, Mr. Diresbaugh. In addition, raffle prizes went to Jim Holm, J. Gamble and Bill Emery.

The prizes, which included rifles, shuffle boards, golf balls, blankets, poker chips, American flags, picnic cases, fishing poles, brief cases, croquet sets, and card tables, were made possible by generous donations received from the following concerns:

American Cyanamid & Chemical Co., Arrowhead Lime Co., Binney & Smith Co., L. H. Butcher Co., T. A. Desmond, Dill Mfg. Co., Firestone Tire & Rubber Co., B. F. Goodrich Co., Goodyear Tire & Rubber Co., C. P. Hall Co., D. Hecht & Co., J. M. Huber, Inc., Hycar Chemical Co., National Standard Co., Naugatuck Chemical, Reinke-Hiller & Amende, H. M. Royal, Inc., San Francisco Sulphur Co., A. Schrader's Son, Sierra Talc Co., Lombard Smith Co., Stanco Distributors, Thiokol Corp., United States Rubber Co., R. T. Vanderbilt Co., Western Insulated Wire Co., Western Shade Cloth Co., Charles T. Wilson Co.

A list of directions and precautions to be followed in placing synthetic rubber tubes in use has been issued by the Goodyear Tire & Rubber Co., Akron. Extreme caution is recommended in the mounting operation.

A new oil and grease absorbent and floor cleaner, under the name of Absorbo, has been developed by the Fidelity Chemical Products Corp., 430 Riverside Ave., Newark, N. J. It is recommended for reducing fire and slipping hazards and for cleaning floors.

Some of the activity at the Los Angeles Outing is depicted in the above photos. UPPER LEFT: Contestants in the 49er Contest. First prize went to Lotar Jung (U.S. Rubber), fifth from left, and second prize to Vic Vodra (Vanderbilt), third from left. UPPER RIGHT: The card and game tables received full play. LOWER LEFT: Joe E. Brown, movie star, addressing the crowd at breakfast. Others in the background, left to right, include Al Pickard (Braun Corp.), Sid Pike (T. A. Desmond), Ed Lewis (Western Insulated Wire), and Galen Norton (Kirkhill Rubber). CENTER: Left to right, Lombard Smith, Al Pickard, Ed Cunningham (Stanco Distributors), and Ed Royal (H. M. Royal) enjoy a little swim. LOWER RIGHT: MacNeel Pierce (Plastics & Rubber Products), left, greets William S. Haney (Kirkhill Rubber).

NORTHERN CALIFORNIA GROUP HOLDS FIRST ANNUAL OUTING

Approximately 120 members and guests attended the first annual outing of the Northern California Rubber Group, held on August 8 at the Old Hearst Ranch near Pleasanton, California, a truly Spanish Hacienda a quarter of a mile in length in a setting of 510 acres of flowers, tropical trees, green lawns and beautiful shrubbery. The outing was unique in that the families of the members as well as their friends were invited.

Recreational facilities at the Ranch included one of the finest golf courses in California, a large swimming pool, tennis courts, ping pong tables, billiards, baseball, dancing, saddle horses, and playgrounds for the youngsters. All of the facilities were put to good use, the day's activities including golf, swimming contests, horseback riding, dancing, and a rubber chemicals guessing contest. Following the various events, a big "al fresco" dinner was served in the barbecue grove by an open fire, featured by the distribution of some 150 prizes.

Winners of the major prizes included the following: *Guessing Contest* — George Petelin (Goodyear) and Paul Mallard (Mare Island Navy Yard); *Golf Tournament* — Emil Burger, low gross; Richard Harmon (Mare Island Navy Yard), low net; Lorin Davis, third prize; and Mrs. Edward Evans, ladies' prize; *Swimming Contest*—Herman Jordan (DuPont) and William Armstrong (American Rubber); *General Prizes* — Herman Jordan (DuPont), Wayne Shipley (American Rubber), and George Petelin (Goodyear).

The prizes were made possible by generous donations received from the following companies: American Rubber Mfg. Co., Bertsch Machine Works, DuPont, Farrel-Birmingham Co., Goodyear Rubber Co., Hercules Rubber Co., Oliver Tire & Rubber Co., Pacific Coast Rubber Co., Pioneer Rubber Mills, Plant Rubber & Asbestos Works, Reliance Rubber Co., H. M. Royal, Inc., Shell Chemical Co., Stanco Distributors, Inc., R. T. Vanderbilt Co.

Additional "E" Awards

White stars to be added to Army-Navy "E" flags previously awarded for production efficiency have been awarded to the Niagara Falls and Louisville plants of the B. F. Goodrich Co. and to the Mishawaka, Ind., plant of the U. S. Rubber Co. The addition of the white star signifies that the companies maintained and increased the high standards of production on which the original award was made. Gold stars, signifying continued production achievement, were recently awarded by the Maritime Commission to Jenkins Brothers, Bridgeport, Conn.; Mine Safety Appliances Co., Pittsburgh, Penna.; and the Simplex Wire & Cable Co., Cambridge, Mass.

OBITUARIES

G. A. Anderegg

Gustavus A. Anderegg, former cable development engineer of the Bell Telephone Laboratories, and widely recognized as a leading expert in the wire and cable field, died at his summer home in Lockbourne, Ohio, last month. Mr. Anderegg, who retired from active business in 1938, was 70 years old.

A graduate of Oberlin College, Mr. Anderegg also held B.A. and M.A. degrees from Harvard University. He became a member of the Western Electric Co. in Chicago in 1902 and later taught at Harvard and at Ohio State University. He returned to Western Electric in 1908 and in 1913 was placed in charge of all lead-covered cable developments. In 1921 he supervised the manufacture and laying of telephone cables across the Florida straits and in 1924 performed a similar function in connection with the cable between New York and the Azores.

Mr. Anderegg leaves a widow, a son, now in the Navy, and a daughter.

Carl H. Hazard

Carl Harwood Hazard, president of the Hazard Advertising Corp., advertising agency for several well-known suppliers of rubber chemicals and compounding ingredients, including the American Cyanamid & Chemical Corp. and Wishnick-Tumpeer, Inc., died at his home, 52 West 53rd St., New York City, on August 23, after an illness of more than a year. Born in Stamford, Conn., he was 49 years of age.

A member of the American Chemical Society and the Chemists' Club, Mr. Hazard was widely known in the chemical and industrial advertising fields for more than 20 years. His entire business career had been in sales and advertising activities. In his early twenties, he was associated with the American Synthetic Color Co. and later with H. A. Metz Laboratories, Inc.

Mr. Hazard served with the Chemical Warfare Service in the last World War. The Hazard Advertising Agency was established in 1920.

Horatio N. Gilbert

Horatio N. Gilbert, retired rubber manufacturer, died at his home in North Marion, Mass., on August 29 at the age of 58. Born in Milton, Mass., Mr. Gilbert was graduated from Milton Academy and from Harvard College in 1907. He was associated with the old Three C's Fire, Hose & Rubber Co., of Canton, Ohio, for many years, leaving that organization about 18 years ago to enter the real estate business. A widow survives.

Frank S. Frost

Frank S. Frost, owner and manager of the Frost Rubber Works, Chicago, died on August 9 at the age of 67. Death was caused by an inner ear infection of very short duration. Born in Chicago on September 8, 1876, Mr. Frost first became associated with the rubber industry with the old Diamond Tire & Rubber Co., with which he served for many years. Later, he entered into the jobbing of rubber products which in 1920 lead to the formation of the Frost Rubber Works, a partnership. The business will be continued by two surviving sons, Francis S. Frost, Jr., and Elmer F. Frost.

Eugene T. Trotter

Eugene T. Trotter, founder and president of E. T. Trotter & Co., 602 Johnson Ave., Brooklyn, N. Y., manufacturers of insulating materials, died at his home in Brooklyn on September 3 at the age of 77. Born in Bound Brook, N. J., Mr. Trotter had lived in Brooklyn for more than 50 years. He established the business bearing his name in 1896 and incorporated it in 1906. He was also chairman of the boards of the Ettco Tool Co. and the Pyro Products Corp. A daughter survives.

Rules for the use of synthetic rubber camelback have been compiled by the U. S. Rubber Co. Copies can be secured by writing to J. G. Schaefer, Tire Division, U. S. Rubber Co., 1230 Sixth Ave., New York City.

The Safety Research Institute is urging the managements of industrial and business establishments to give special attention to the care of first aid fire appliances on the occasion of Fire Prevention Week, October 3 to 9. General rules for prolonging the life of such appliances have been issued by the Institute.

The 1943 Edition of "Accident Facts" has been issued by the National Safety Council, Inc., 20 No. Wacker Drive, Chicago, Ill. Copies may be secured at a cost of 50 cents per copy in lots of from 1 to 10 copies. Orders for more than 10 copies secure special rates.

The "Deduct-O-Graph," a device which automatically shows the proper payroll tax deduction for any employee when proper settings are made as to marital status, wage range and pay period, is offered without cost by the George S. May Co., 2600 North Shore Ave., Chicago, Illinois. Requests must be addressed on business letterheads.

New Synthetic Cohesive Cement

A. P. C. Cohesive Cement, a product which is said to meet the demand for a cold cement which is not dependent on a rubber composition, and which exhibits many of the properties of rubber cement, has been developed and introduced by the Advance Packaging Corp., 60 East 42nd St., New York 17, N. Y. The new cement is said to contain the best qualities of rubber cement, including good rub-off, powerful bond, and the ability to set and reset after prolonged delay. It is applied in the same manner as the rubber product and has minimum penetration. It is also water-resistant, and is completely free from tackiness when dry.

Philblack Production Planned

Construction of a plant for the manufacture of Philblack, one of the newer type furnace blacks, has been announced by the Phillips Petroleum Co., of Bartlesville, Oklahoma. The new plant, which will produce approximately 22,000,000 pounds of the new black per year, is being built as a private enterprise by Phillips adjacent to the butadiene plant operated by the company for the government in the Texas Panhandle. Passenger car tires of GR-S and Philblack tested during the past year are reported to have run 37,000 miles at 60 miles per hour before they were retreaded and testing continued for another 25,000 miles.

Form Thiokol Technical Club

Patterned after the inner-company technical club organized some time ago by the Gates Rubber Co., the Thiokol Technical Club has been organized, the membership of which is composed of chemists of the Thiokol Corporation. The new group is entirely autonomous. It elects its own officers and sets its own agenda for all meetings which are devoted entirely to rubber and synthetic rubber research and development. Papers prepared by individual members are read at each monthly meeting. In the near future, the club plans to expand its activities by inviting speakers from other rubber companies and suppliers to address it.

Chicago to Hear Vila

George R. Vila, of the Naugatuck Chemical Division of U. S. Rubber Co., Naugatuck, Conn., will be the principal speaker at the next meeting of the Chicago Group, Rubber Division, A.C.S., scheduled to be held at the Morrison Hotel in Chicago on Friday, October 15. Mr. Vila will talk on "Some Practical Aspects in the Processing and Compounding of GR-S." A second speaker, who will deliver an address on a non-technical subject, will also be heard. The meeting will start at 6:30 P. M.

AS YOU NEVER DROVE BEFORE!

Many a soldier owes his life to a commander who drove him to the utmost in battle—*never let him slacken for a single fatal instant!* And after the war, many a worker will owe his economic safety to a leader who drove him continuously for higher Pay-Roll allotments for the purchase of War Bonds!

Despite higher taxes and prices, the average worker still has more money than ever before—particularly on the basis of the *family* income. With others in the family earning, too, just let the worker 'figure it out for himself', and he usually will realize that *now* he can put more into War Bonds than he has been doing.

That's why the Treasury Department has set new quotas for the current Pay-Roll Allotment Drive—*quotas running about 50% above former figures.* These quotas are designed to reach the *new* money that's coming into the family income. Coming from millions of new workers . . . from women who never worked before . . . from millions who never before earned anything like what they are getting today!

The current War Bond effort is built around the *family* unit, and the Treasury Department now urges you to organize your War Bond *thinking*—and your War Bond *selling*—on the basis of your employees' *family* incomes. For details, get in touch with your local War Finance Committee which will supply you with all necessary material for the proper presentation of the new plan to your workers through your labor-management committees.

Today about 30,000,000 wage earners, in 175,000 plants, are buying War Bonds at the rate of nearly half a billion dollars a month. Great as this sum is, *it is not enough!* So turn-to today! Get this new *family income plan working!*

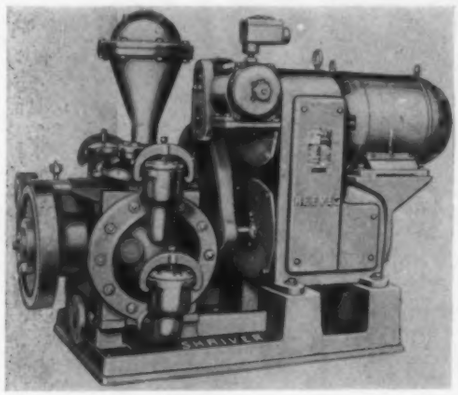
This Space Is a Contribution to America's All-Out War Effort By

THE RUBBER AGE

NEW EQUIPMENT

Shriver Diaphragm Pumps for Latex

The pumping of latex has always been a difficult problem due to the tendency of the latex to coagulate on exposure to air or when subjected to an agitating motion of any kind. The production of synthetic rubber, which passes through a latex stage, brought this problem to the fore and dozens of pumps were tested



before a few were found satisfactory and received semi-official approval. One of these is the Shriver Diaphragm Pump, a product of T. Shriver & Company, Harrison, N. J.

According to its manufacturer, there are several good reasons why Shriver Diaphragm Pumps are able to handle the tough job of pumping latex in the synthetic rubber plants, where they are now being used to pump the "sludge" from polymerizing vessels to blow down tanks to flash tanks and, in some cases, to blending vats. For one thing, the activating mechanism of the pump does not come into contact with the fluid being pumped. A rubber diaphragm at each end of the double acting reciprocating mechanism seals off the piston proper from the liquid ends. Thus there are no packings which can allow entrance of air into the liquid ends on the suction stroke. In this way one potent source of premature coagulation, the presence of air, can be eliminated.

The entire liquid end of the pump is completely filled with latex at the end of the suction stroke. The pressure stroke is the result of the action of the piston against the rubber diaphragm. There is no occlusion of latex between the piston and the walls of the cylinder as the case with piston pumps. (Even where the clearance between the piston and cylinder is considerable in any type of piston pump there is induced turbulence which causes premature coagulation, though rubbing action is less.) The pressure stroke of the Shriver Diaphragm Pump expels the latex in a smooth volume evacuation without aeration or turbulence. There is no excessive rubbing action at either the intake or output ball valves which are amply proportioned for smooth non-agitated discharge.

Moreover, the surfaces of all internal parts of the liquid ends of the Shriver Diaphragm Pump, as used in synthetic rubber manufacture, are rendered extra

VULCANIZED VEGETABLE OILS

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Time Tested Properties

Known aging qualities
Low cost factor
Low specific gravity
Aid to mechanical processing operations
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Aid to maintaining fixed hardness
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1903
SPRINGFIELD, NEW JERSEY

Johnson's Wax Finishes for Rubber Goods

• Like so many products, Johnson's Wax Finishes for Rubber Goods have gone to war. They are available now for materials and products made specifically for war use only.

If you are a manufacturer of rubber products for war use, Johnson's Wax Finishes may very well be helpful to you. They prolong the life of rubber goods because they retard oxidation, the destroyer of rubber. Johnson's Wax Finishes for Rubber Goods are easy to apply by dipping, spraying or wiping. Coverage is good. Sizes available: 5 and 55 gallon drums.

Some day . . . and we hope it isn't too far away . . . we shall again be able to supply wax finishes to manufacturers for peacetime use on rubber goods such as automobile door gaskets, rubber hose, tubing, rubber-covered wire, refrigerator gaskets, tires, stair tread, and the like. These wax finishes not only protect by retarding oxidation, but they also add greatly to appearance value.

But for the duration, Johnson's Wax Finishes for Rubber Goods must serve Uncle Sam first.

★ BUY U. S. WAR BONDS AND STAMPS ★

S. C. JOHNSON & SON, INC.
Industrial Wax Division, Dept. RA-93
Racine, Wisconsin

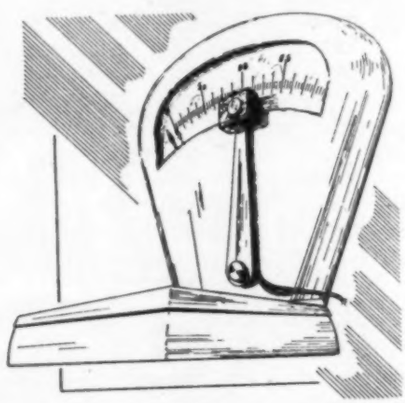
smooth by a special synthetic resin enamel coating which causes the least possible surface friction as the latex passes over them. This leads to a further reduction in rubbing action as well as reducing the tendency for coagulated latex to deposit on the surfaces.

Obviously some coagulation and deposition takes place and even these pumps have to be cleaned at intervals. However, cleaning is necessary far less frequently than of any other pumps and the design of these units makes cleaning speedy and easy. Removal of a few nuts permits the removal of the liquid ends from the pump, exposing all interior surfaces for quick easy cleaning. Ball valves have large easily removed covers for inspection and cleaning of balls and seats, while the manifold is equally accessible.

Automatic Photo-Electric Cut-Off

An automatic photo-electric cut-off which offers interesting possibilities in connection with automatic weighing, including batch weighing, is currently being marketed by the United Cinephone Corp., Torrington, Conn. The components of the cut-off include a scanner, or small housing containing a light source, a photo cell and an amplifier tube, and a control, a second housing containing an amplifier and relay.

The cut-off device operates from light reflected from the indicating pointer, and therefore successful application requires a non-reflective scale face and a pointer with a reflecting surface. An indicating pointer of any



light color or of polished metal provides satisfactory operation. The scanner should be so mounted that its position is adjustable for operation throughout the indicating range of the instrument on which it is used, a suggested method being shown in the accompanying sketch.

In operation, the scanner position is adjusted to the point on the scale at which actuation of the control is desired, after which the weighing operation is initiated. The light source within the scanner projects a beam of light through an aperture to the scale face and when the indicating pointer intersects the light beam, an increase is caused in the quantity of light reaching the photo cell. By means of the light sensitive properties of the photo cell, this fluctuation is converted to an electrical impulse which receives a first stage of amplification from the amplifier tube in the scanner. Through the control amplifier, this impulse causes operation of the relay which in turn actuates the control mechanism.

Micro-Poise Tire Balancing Machine

The Micro-Poise Precision Tire Balancing Machine, now installed on the production line of several tire factories, is said to be the simplest and most accurate horizontal type machine of its kind. It is a product of the Commerce Pattern Foundry & Machine Co., 2211 Grand River Ave., Detroit, Michigan. An automatic direct reading level is so placed that it is directly in front of the operator, in the center of the unit, so that

it is not necessary to look over the tire to read the degrees and determine the amount of unbalance, if any. The reading level furnishes the exact amount of unbalance in ounce inches, from 0 to 250, and also determines the location of either light or heavy spots of the tire.

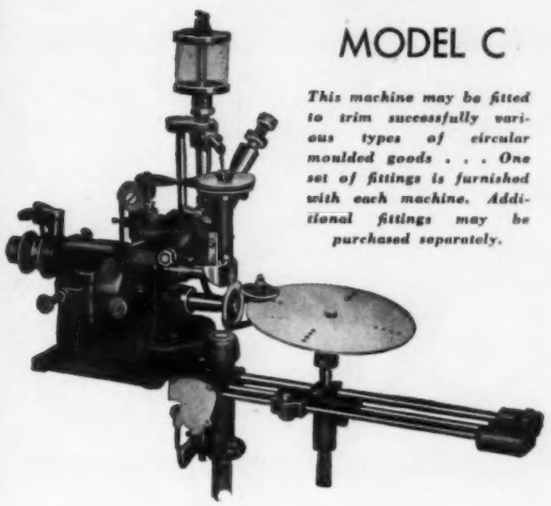
Graduations on the adapter, located in the center of the unit, correspond to the markings on the automatic level, thus facilitating the finding of the exact spot of unbalance. The adapter expands and contracts by means of a turn-handle, so that an even pressure may be exerted on the bead to avoid diameter variations. When this adapter is in the loading or unloading position, there is a clearance of ⅜ths to ½ inch between the adapter and the bead of the tire and, therefore, the operator can easily remove the tire from the machine with one hand, thus eliminating the need for a tire ejector. The adapter is used for the first balance (casings only) and the complete or second balance (casings with tubes inserted). An aperture for the valve stem of the tube is provided on the unit.

The automatic direct reading level of this tire balancing machine does not oscillate, since it is controlled by a special device on the inside of the base of the machine, and the level comes to a complete stop in less than two seconds. The size of the bubble is controlled by a thermostat and changes in temperature in no way affect the size of the bubble. Under actual working conditions, the Micro-Poise balancing machine handles an average of 300 tires per hour in an 8 hour day. Actual production rate, however, is said to be closer to 400 tires per hour. The machine can be used for different tire sizes by simply changing the adapter, accomplished by the handling of two pins only. Changeover from one tire size to another can be accomplished in about five minutes.

USMC TRIMMING MACHINE

MODEL C

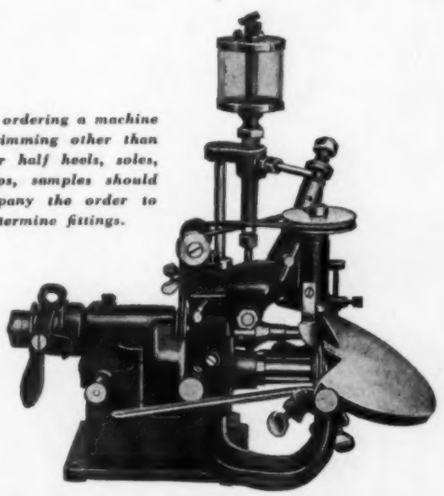
This machine may be fitted to trim successfully various types of circular moulded goods . . . One set of fittings is furnished with each machine. Additional fittings may be purchased separately.



A new and improved machine for trimming the overflow on all types of moulded rubber heels, soles, taps, and miscellaneous moulded rubber goods of similar construction.

Oil is the standard means of lubrication. A water tank is shipped, only when specifically ordered, at an extra charge.

When ordering a machine for trimming other than regular half heels, soles, or taps, samples should accompany the order to determine fittings.



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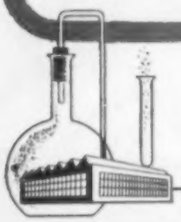
PROVED completely satisfactory by one of the largest manufacturers of Barrage Balloons, Union Bay State's Neoprene Base Cements will solve your cementing and seam-sealing problems. Developed as a result of many years of pre-war and war product experience with Neoprene Compounds, this is, as far as we know, the only line of "non-toxic" Neoprene Cements which combines a pleasant odor with fast drying speed. *Phone, wire or write for samples and further information.*



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Hand Grip Rubber Gauge No. 3-B

Height .....9"	Length .....9¾"	Range .....½"
Depth of Throat ....6½"	Dial 50 Divisions Each Div. 1/1000"	Weight .... 4 lbs. Frame . Aluminum

Designed for gauging stock as it is coming from the calender.

FRANK E. RANDALL, Waltham, Mass.

Asbury Fluid Impact Mill

Designed to act upon fluids by utilizing a specially developed rotor to produce impact by means of centrifugal force, the Asbury Fluid Impact Mill has been introduced by the Asbury Impact Mill Co., Abington, Penna. The rotor of the new mill divides the liquid materials into the form of a fine mist, the particles of which are driven by centrifugal action at tremendous

velocity against an impact ring, designed to direct the fluid film so formed into the periphery of the rotor and then discharged.

Because of the lack of frictional contact, no adjustments are necessary, but pulley speed changes can be made if desired. The clearance throughout the mill is in excess of twenty-thousandths of an inch. Because of the large amount of the coolant area, the dimensional changes due to high or low temperatures have no effect on the operation of the mill. In consequence, it can be operated at any temperature at which fluid treatment may be desired, ranging from that of liquid air to that of boiling mineral oil without any adjustment or fear of damage to the equipment.

The applications of this new piece of equipment are manifold. Emulsions of mineral and vegetable oils, latex and waxes, as well as those of animal and marine origin, have been improved. Multiple admission ports admit of feeding several materials simultaneously, thus permitting the production of a finished emulsion in one continuous process. The multiple port feature also lends itself to the continuous production of uniform and finely divided pigments, organic and inorganic. The dispersions of pigments, clays and fillers can be carried out successfully in the mill.

A new **industrial humidifier,** only 10 inches long and 3 inches in diameter, capable of dispensing 42 pounds of water per hour or 120 gallons in 24 hours, is currently being distributed by Techtmann Industries, Inc., 828 North Broadway, Milwaukee 2, Wisconsin. It is known as the Skilbeck E-120 Industrial Humidifier, and is installable in single units or in clusters of 2 to 10 or more.

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in the manufacture of machinery for

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ALSO GENERAL MACHINE WORK

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TIRE BUILDING DRUMS AND MOLDS

FOR ALL SIZES AND TYPES OF TIRES

BAND BUILDERS	MECHANICAL PRESSES	TIRE PRESSES
with squeegee applicators	200 - 400 - 750 ton sizes	45" - 55" - 65" singles and duals

The Akron Standard Mold Co.

Akron — "The Established Measure of Value" — Ohio

Concerning the RUBBER RED BOOK

To those who have written in or telephoned asking when the RUBBER RED BOOK would be published, and to all others who are awaiting their copies of the 1943 edition — we assure you that every effort is being made to get the Directory into the mails next month.

Shortage of manpower — both in our offices and at our printer — has delayed us at every stage of production. Some suppliers and rubber manufacturers also have been slower than usual in returning their questionnaires.

However, our whole staff is foregoing all vacations and working right through the summer to get the book out as soon as possible. We appreciate the interest shown in the RUBBER RED BOOK and ask all our friends to bear with us a while longer.

The Publishers

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New ideas or patents relating to equipment, apparatus, or instruments applicable to research and control laboratory work, embracing—

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REVIEWS

BOOKS

Industrial Safety. Edited by Roland P. Blake. Published by Prentice-Hall, Inc., 70 Fifth Ave., New York, N. Y. 6 x 9 in. 435 pp. $5.00.

Co-authored by eight leading executives in the field of industrial safety, and containing a foreword by Henry T. Heald, president of the Illinois Institute of Technology, this book represents an excellent analysis of the principles which must be practiced by every industrial organization to avoid costly accidents, particularly in a wartime period. It should prove not only valuable as a textbook for safety engineering classes, but also as a reference works for those now charged with the operation of safety programs.

There are thirty-one chapters in all, in addition to a specially compiled list of safety references and a carefully cross-referenced subject index. The co-authors include T. O. Armstrong, Roland P. Blake, J. J. Bloomfield, C. B. Boulet, M A. Ginbel, S. W. Homan, W. Dean Keefer, and R. T. Page. Many of these names will be familiar to safety engineers. The text matter is considerably lightened by the inclusion of a number of cartoons. These cartoons were prepared especially for the safety engineering program of Purdue University and their use as work sheets for regular engineering campus courses and for Engineering, Science and Management War Training courses has been extremely successful.

BOOKLETS, CATALOG, Etc.

Characteristics of Wild Rubbers. (Publication No. 34.) By G. R. Tristram, G. Gee, L. R. G. Treloar and G. A. Jeffrey. British Rubber Producers' Research Association, 19 Fenchurch St., London, E. C. 3, England. 5½ x 8½ in. 4 pp.

The characteristics of a group of five wild African rubbers (*Funtumia, Clitandra, Landolphia, Ficus, Platyphylla* and Niger Paste), based on a brief examination, as compared with corresponding observations for *Hevea* rubber, balata and a specimen of Malayan *Ficus elastica* are discussed in this publication, a reprint of the original material which first appeared in *I.R.I. Transactions.* Characteristics covered included composition, molecular weight, physical properties, and x-ray examination. The conclusion is reached that the rubbers examined are without exception polyisoprene rubbers, identical in their chemical constitution, and, when purified, similar in physical characteristics to ordinary *Hevea* rubber.

•

Why Is Rubber Elastic? (Publication No. 35.) By L. R. G. Treloar. British Rubber Producers' Research Association, 19 Fenchurch St., London, E. C. 3, England. 5½ x 8½ in. 10 pp.

An attempt to supply the answer to the question of why is rubber elastic, based on a simplification of the kinetic theory of elasticity, is furnished by this publication, reprinted from a recent issue of *I.R.I. Transactions.* The earlier theories of elasticity are reviewed and the kinetic theory of elasticity outlined. The author states: "There can be no doubt that the kinetic theory, though requiring modification and amendment in its application to real materials, does provide a better understanding of the phenomenon of rubber-like elasticity than any other theory yet advanced, because the assumptions on which it is based are in accordance with the known chemical properties of molecules."

Resins and Lacquer Emulsions

—Developed to meet the need for *Substitutes*, *Extenders* and *Modifiers* for LATEX and RECLAIM

VULPRENES—Solid Modifiers and Substitutes

—for CRUDE, RECLAIMED and SYNTHETIC RUBBER

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RESIN AND LACQUER EMULSIONS—These emulsions are being used today as *Latex Modifiers* and *Complete Latex Replacements* to extend, thicken, stabilize, increase penetration, improve resistance to acids, oils and solvents; in *Coatings* to produce adherent pigmented or clear coatings on paper, fabric, and rubber and as intermediate coats for lacquer on rubberized cloth; in *Rubberizing* textiles; in *Latex Treated Papers* to increase strength and improve ageing; in *Adhesives*, for paper, for leather to cloth, and cloth to cloth.

VULPRENE SOLUTIONS AND DISPERSIONS. These forms of Vulprene are being used for adhesive tapes, marking paper, water-resistant coatings, etc. *Vulprene Latex* is used as a latex extender particularly as shoe adhesives, for impregnation of paper, can sealing compounds and coating materials. Modifiers for neoprene and Buna S.

ALKYD 18- -an alkyd type resin emulsion which is non-yellowing and non-oxidizing. Film is water-white and non-tacky. Preferred where slight oxidizing action may be considered harmful to rubber. Extender for latex and reclaim in coating, combining and impregnating process.

EMULSION 58-8—a series of emulsified elastomers containing up to 65% solids. Recommended for use as full latex replacements in impregnation and combining.

PIGMENT BASES—concentrated aqueous dispersions of pigments in resin bases, available in all shades and viscosities, suitable for spreading, spraying, etc.

Also Acrylic, Vinyl, Maleic, Phenolic, Hydrocarbon, Ethyl Cellulose, Cellulose Acetate and Nitrate emulsions and solutions for various applications.

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Reproduce trade-marks or lettering on your product for attractive, safe, economical identification. The research and experience of over 40 years in supplying identification for textiles, rubberized fabrics, artificial leather and other products is at your disposal.

Send a sample of your product and we will show you how Kaumagraph Dry Transfers can mark it.

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MATERIALS

WRITE FOR DETAILS

MERCER-ROBINSON COMPANY INC

30 CHURCH ST NEW YORK 7, N. Y.

The Improvement in Thermal Shortening and Fatigue (Cut Growth) of GR-S Treads. Columbian Carbon Co., 41 East 42nd St., New York, N. Y. 5½ x 8 in. 36 pp.

Admittedly, the basic defects of GR-S have been defined but not defeated. Practically all rubber laboratories are now working on refinements where the compounding of GR-S is concerned. A drastic approach to some of the existing problems was recently employed in the Columbian Carbon research laboratories, an attempt being made to press the "carbon effect" close to its limit. Carbon additions, properly balanced with active or solvent type softeners, were pushed to about double the prevailing ratios. The compounds employed and the results ascertained are described and discussed in this bulletin.

The high carbon-high softener approach produced several striking effects, chief among them being the following: tensile strength, modulus and breaking elongation were maintained despite drastic dilution of the polymer content; thermal shortening and fatigue were improved two to threefold; hysteresis effects did not suffer as might be expected. While a compound of the automobile tread type was used as the basis for the work, the same compounding principle should apply equally to compounds used for mechanical goods, footwear and insulated wire.

"Summary cards," which bring out the salient points of the study, are furnished with the bulletin. These cards present at a glance the type of formulation employed and the effects produced. It is suggested that the cards be turned over to assistants working on the compounding of GR-S.

•

Monsanto Chemicals for the Rubber Industry. Rubber Service Dept., Monsanto Chemical Co., Akron, Ohio. 9 x 11½ in. 32 pp.

This is a revised tabulation of accelerators, antioxidants, colors and other compounding ingredients supplied by Monsanto to the rubber industry. Specifications and use data are furnished for each chemical, with typical applications, based on 100 parts of rubber or synthetic rubber, indicated in most cases. The list of applications is by no means complete, but is intended only as a guide for the prospective user. Quantities shown in these typical applications may be considered to be average practice and variations will have to be made to suit specific cases. Some information on Monsanto deodorants is also included.

•

GR-S in Wire and Cable Compounds. R. T. Vanderbilt Co., 230 Park Ave., New York, N. Y. 8½ x 11¼ in. 12 pp.

Several grades of insulation and jacket compounds of GR-S for use on wire and cable are shown in this laboratory report. For the most part, the compounds shown are laboratory developed compounds, though many of them have been run successfully in the factory and all have been extruded in the laboratory. Code grade insulation, performance grade insulation, heat resisting insulation and oil base insulation compounds are covered. Observations on acceleration, antioxidants, fillers, plasticizers, and factory procedure are made.

•

Automatic Proportioning Equipment for the Process Industries. (Bulletin No. 1700). % Proportioneers, Inc., 9 Coddling St., Providence, R. I. 8½ x 11 in. 8 pp.

In addition to illustrating and describing the complete line of constant rate and flow responsive proportioning equipment featured by the company, this bulletin contains many flow diagrams showing the latest applications engineered by the company in the process industries. Among operations described and diagrammed are treating water, blending ingredients in the production of synthetic rubber and plastics, diluting caustic or other concentrate for the reclaiming of rubber, and sampling of end products for continuous check.

Rubber Stretches but Tolerances Don't!

PRECISION
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In a mechanized war, accuracy in rubber parts is just as important as in those of metal. Accuracy demands precision molds, and efficient producers demand ELECTRIX precision molds. For, it stands to reason that if the molds are accurate, the molded parts from them are accurate, too.

Our plant works to accuracy of .00005 in making metal gages, so precision is our business. Naturally, the same degree of skill is used in everything we make, and that, plus our long experience as engineers to the rubber industry, makes us a logical source for molds.

Your inquiry is invited.

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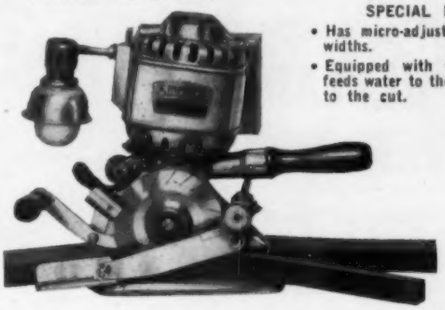
PATENTED

A PORTABLE machine capable of stripping slab rubber up to 1" thick at the rate of 20,000 feet in 8 hours. Any width desired.



SPECIAL FEATURES

- Has micro-adjustment for accurate widths.
- Equipped with water tank which feeds water to the slotted knife and to the cut.
- Has repulsion-induction motor which carries any overloads.
- Automatic sharpener device keeps knife keen and sharp.
- Has base with rollers and is very easy to handle.

Cuts within 1/64 inch to 1/100 inch tolerance depending on grades of rubber. Cuts a slab down to the last shaving. Cuts all grades of rubber including pure gum, sponge, etc. Cuts squarely—no rejects.

Now in use by many leading Rubber Manufacturers & Jobbers

Simplex Cloth Cutting Machine Co., Inc.

Manufacturers of a Complete Line of Cloth Cutting Machinery

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WHITTAKER
ESTABLISHED 1890

These three types of calcined magnesia meet requirements of quality and cost:

- **LIGHT**—The highest type. For the most exacting compounds. Fine particle size. Low moisture and carbonate content.
- **MEDIUM**—For less exacting requirements and where costs must be kept down. Fine particle size and low moisture content.
- **HEAVY**—Meets low cost need where high type compounding is not essential.

Samples, prices and additional information on request

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60% LATEX
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RECLAIMED
RUBBER DISPERSIONS
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—Orvus permits articles to leave molds readily; molds clean easily.
—Orvus is effective in hardest water.
—Orvus forms no insoluble materials which might be deposited as a film on mold or rubber.
For WASHING and FINISHING
—Orvus cleans thoroughly such articles as inner tubes, automotive parts and other molded and extruded rubber goods. Leaves articles with a pleasing finish.
Write for further details about Orvus.
PROCTER & GAMBLE
CINCINNATI, OHIO
ORVUS*
*ORVUS is a sulfated alcohol type cleanser—not a soap.

Chemical Industry Survey: 1943. Issued by Merrill Lynch, Pierce, Fenner & Beane, 70 Pine St., New York, N. Y. 8½ x 11 in. 56 pp.

The real birth of chemistry in the United States as an industry took place in the last World War when America was forced to produce manufactured dyes, medicinals and other chemicals, heretofore imported from Germany. The amazing growth of this industry in the past 25 years—the first quarter century of its real industrial existence—is outlined in this new survey. New opportunities being grasped by the industry as the result of the new challenge represented by the latest global conflict are also discussed. The basic industrial and financial position of several leading chemical companies, including Air Reduction, Allied Chemical, American Cyanamid, Atlas Powder, Columbian Carbon and DuPont, is also discussed.

•

Selenac in GR-S-Reclaim Compounds for Mechanical Goods. R. T. Vanderbilt Co., 230 Park Ave., New York, N. Y. 8½ x 11¼ in. 8 pp.

As indicated by its title, this laboratory report covers the use of Selenac in GR-S-Reclaim compounds for mechanical rubber goods. Various ratios of GR-S and Reclaim are shown so as to give general information for application. According to the report, the Selenac sulfurless combinations have the same outstanding properties in stocks containing mixtures of GR-S and Reclaim than they have in straight GR-S stocks, the superior qualities of the compounds being shown by increased tensile and greater retention of elongation after heat aging as compared to similar sulfur compounds.

•

Effect of Holes and Ruts in Highway Pavements on Tire Life. Published by Automotive Council for War Production, New Center Building, Detroit 2, Michigan. 8½ x 11 in. 8 pp.

Compiled by the SAE War Engineering Board for the Automotive Council for War Production at the suggestion of Rubber Director Jeffers, this report describes and illustrates the effects of holes and ruts in highway pavements on tire life. The results furnished are based on special surveys and studies made by various associations and organizations over a period of years, including the tests conducted by the Rubber Manufacturers Association, in conjunction with the Society of Automotive Engineers, in 1930-31.

•

Piccoumaron Resins. Pennsylvania Industrial Chemical Corp., Clairton, Penna. 8 x 11 in. 6 pp.

Some of the almost endless uses for the para-coumarone indene resins sold by the company under the name of Piccoumaron are briefly described in this folder. Specific uses for many of these resins are suggested. In rubber, for instance, it is pointed out that the softer grades are used to give tack to rubber, especially for pile operations, while the very soft grades are used as both softeners and plasticizers, allowing easy incorporation of pigments and fillers. Fields covered by the folder include, in addition to rubber, paints, varnishes, inks, adhesives, floor tile, textiles, and concrete curing cements.

•

How Electronic Tubes Work. (GEA-4116). General Electric Co., Schenectady, N. Y. 8 x 10½ in. 24 pp.

Illustrated with 117 sketches and photographs, this booklet is actually a primer whose main emphasis is on how the electronic tube operates. Designed primarily for industrial engineers, the eight basic types of industrial electronic tubes and their uses are described. Non-technical language is employed.

SULPHUR and CHEMICALS FOR THE RUBBER INDUSTRY

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Caustic Soda, **Sulphur Chloride**

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All types of latex compounded to meet customer's individual requirements.
Aqueous dispersions of reclaimed rubber.
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MARKETS

Rubber – Crude, Reclaimed and Scrap – Cotton – Ducks – Tire Fabrics – Sheetings

NEW YORK, Sept. 14, 1943

Crude Rubber

NOW that the productive capacity of synthetic rubber plants is rapidly reaching the planned figures, there is little doubt that increased attention will be paid to the procurement of crude rubber in the near future. Although efforts in this direction have not been relaxed in any way, they have been overshadowed by the publicity given to the synthetic program. Now, however, increased efforts will be expended in this direction, since it is quite evident that considerable crude is required for some time to come for the manufacture of large-sized, heavy-duty truck, bus and military tires, which still call for 10 to 30% of crude in their composition.

One result of the forthcoming increased effort for the procurement of crude rubber is expected to be expansion of the guayule program. Although this program, with Congressional approval, got off to a fine start, it was subsequently curtailed because the irrigated land in California was more urgently required for food crops. Since this urgency still exists, guayule expansion is probably slated for Texas and Arizona, with a big slice going to Mexico. Several tire leaders are urging widespread cultivation of guayule to the full extent of the acreage provided by the Guayule Bill.

The need for larger imports of crude is also expected to result in greater procurement efforts in Latin America, where problems of manpower, transportation and disease are still major stumbling blocks. Despite the extreme difficulties, however, it is believed that Latin America will easily supply the estimated 40,000 tons in 1943. Whether or not that figure can be doubled in 1944, as anticipated in some quarters, rests largely on how quickly some of the aforementioned problems can be conquered. Renewed effort to overcome these problems can be expected.

Prices shown below are those set by the Rubber Reserve Company:

	C	N-C
Plantations—		
Ribbed Smoked Sheets, 1X	22½	40
Thick Pale Latex Crepe, 1X	22½	40
Thin Pale Latex Crepe, 1X	22½	40
Thick Brown Crepe, 1X	21⅜	38⅞
Thin Brown Crepe, 1X	21⅜	38⅞
Thick Remilled Blankets, #1	21⅜	38⅞
Rolled Brown or Flat Bark	18	35½
Smoked Blankets, #1	21⅛	38⅝
Claro Brand 1XRSS	22½	40
Sole Crepe Trimmings	22	39½
Sole Crepe	22½	40
Wild—		
Uncut Fines, Crude	15	29
Cut Fines, Crude	15½	29¾
Cut Fines, Washed & Dried	22½	40
Upriver Coarse, Crude	12⅜	26⅛
Upriver Coarse, Washed & Dried	20⅛	37¾
Caucho Ball, Crude	11⅝	24¾
Caucho Ball, Washed & Dried	19½	37
Guayule—		
Carload Lots	17¼	31
Less than Carload Lots	18	31½
Balata—		
Surinam Sheet	42½	42½
Manaos Block	38¾	38¾
Colombian Block	38¾	38¾
Peruvian Prime	38¾	38¾
Chicken Wire	23¼	23¼
Latex—		
Normal, Tank Car Lots	26	43½
Creamed, Tank Car Lots	26¾	44¼
Centrifuged, Tank Car Lots	27¼	45¼
Heat-Concentrated, Carload Drums	29½	47

C, for Civilian Use; N-C, for Non-Civilian Use.

Scrap Rubber

No noticeable change occurred in the scrap rubber market during the past month. The Rubber Reserve Co. continues to dominate the market with bids of $15.00 for cars of pneumatic passenger car tires and $10.00 for mixed auto tires. Mixed inner tubes bring $120.00. Stocks are quite substantial and should continue that way for some time to come. The scrap rubber price index recently prepared by the Bureau of Labor Statistics, as part of its weekly index of scrap prices covering all types of waste materials, showed a drop of 18.4% during June, which is said to be no surprise in view of the revisions in scrap tire prices which went into effect about that time. In the opinion of the National Waste Material Dealers Association, automobile wreckers are greatly in need of some help in the sale of tires held by them. Prices shown below are ceilings on typical grades of scrap rubber:

(Prices to Consumers, Delivered Akron)

Mixed passenger tires	ton	$20.00
Beadless truck tires	ton	26.00
Mixed truck tires	ton	20.00
Beadless passenger tires	ton	26.00
No. 1 passenger peelings	ton	52.25
No. 1 truck peelings	ton	52.25
No. 2 passenger tubes	lb.	.07¾
Red passenger tubes	lb.	.07½
Black passenger tubes	lb.	.06¾
Mixed passenger tubes	lb.	.06½
No. 2 truck tubes	lb.	.07½
Red truck tubes	lb.	.07¼
Black truck tubes	lb.	.06½
Buffings	ton	35.00
Bicycle tires	ton	15.00
Air bags and water bags	ton	15.00
Boots and shoes	ton	33.00

Tire Fabrics

The situation in the tire fabric field remains unchanged, with practically no demand for such fabrics. Consequently, prices are nominal and in many quarters are not even being quoted. The prices shown below are those which were in force on or about January 15, 1942.

(Prices Net at the Mill)

Peeler, carded, 23/5/3	lb.	.43½ @	.44
Peeler, carded, 23/4/3	lb.	.44½ @	.45
Peeler, carded, 15/3/3	lb.	.41½ @	.42
Peeler, carded, 15/4/2	lb.	.41½ @	.42
Peeler, carded, 13/3/3	lb.	.40½ @	.41
CHAFERS			
Carded, American, 1 1/16"	lb.	.43½ @	.44
Carded, American, 1"	lb.	.39½ @	.48

Sheetings

48x40	36 in.	5.50	lb.	—	@ 7.818
40x40	36 in.	6.15	lb.	—	@ 6.991
40x36	36 in.	6.50	lb.	—	@ 6.615
48x48	40 in.	2.50	lb.	—	@16.200
48x48	40 in.	2.85	lb.	—	@14.210
56x60	40 in.	3.60	lb.	—	@11.944
48x44	40 in.	3.75	lb.	—	@11.066

Note: Prices shown above are ceiling prices set by order of the O.P.A. Quotations are based on an average price of 15-16-inch middling cotton of 20.37c at the ten designated southern markets.

Cotton

Despite trade disturbances which normally have an immediate and serious reaction on cotton prices, the price for middling uplands on the Cotton Exchange has swung in the narrow range of 51 points since our last report. High for the month was 21.28 on August 30, and low 20.77 on August 21. The average price of middling uplands for the month of August was 21.09, based on 26 trading days. The price dropped slowly but steadily in mid-August, starting with 21.11 on August 12 and falling to 20.77, low for the period, on August 27, with hedging and liquidation responsible for the trend. The market firmed up around August 23 and began an upward trend culminating in high for the period on August 30. The bullishness of the market was aided by continued reports of crop deterioration from nearly all sections of the country. Invasion of Italy and its subsequent capitulation caused the price to drop sharply, reaching 20.98 on September 13. A large scale buying movement by mills, however, brought it back to 21.08 today (September 14). Considerable gains were recorded in futures as a result of the same movement. Quotations for middling uplands on the Exchange follow:

	Aug. 11	September 14		
	Close	High	Low	Close
October	20.00	20.38	20.22	20.36
December	19.87	20.12	20.03	20.10
March	19.72	19.96	19.89	19.91

Reclaimed Rubber

Demand for reclaimed rubber continues at the high level set in recent months and reclaimers see no change in this situation for some time to come, despite the greater availability of synthetic rubber. The recent OPA amendment to the tire rationing regulations which now permits the use of Grade C camelback in the recapping of truck and passenger car tires is expected to lighten the demand for reclaim from the camelback field somewhat, but demands from other branches of the industry will quickly absorb the differential. Grade F camelback, previously required for such recapping, is all-reclaim, while Grade C contains a portion of GR-S. Manpower continues to be a problem of reclaimers, but most factories are holding up at near-capacity. Prices shown below are ceilings on typical grades of reclaim:

Shoe				
Unwashed	lb.	.07	@	.07¼
Tube				
Black Tube	lb.	.11¼	@	.11½
Red Tube	lb.	.12	@	.12¼
Tires				
Black (acid process)	lb.	.07½	@	.07¾
Black, selected tires	lb	.06½	@	.06¾
Truck, Heavy Gravity	lb.	.08½	@	.08¾
Miscellaneous				
Mechanical blends	lb.	.04½	@	.05½
White	lb.	.13	@	.13¼

Ducks

Enameling (single filling)	lb.	—	@	.44¼
Belting and Hose	lb.	—	@	.39
Single filling, A grade	lb.	—	@	.19¾
Double filling, A grade	lb.	—	@	.20¾

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PLASTICIZERS FOR SYNTHETIC RUBBER.

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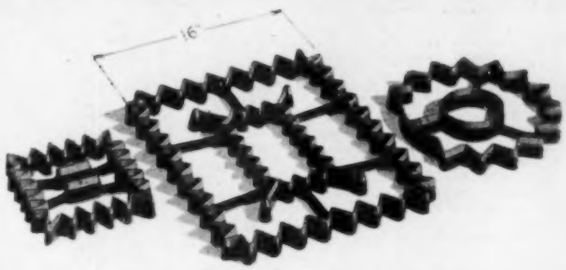
Machine Parts and Special Machinery



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GAMMETER'S
ALL STEEL **ALL WELDED**
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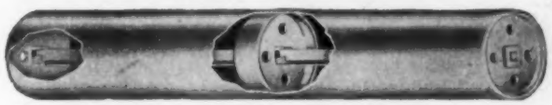

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Besides our well known Standard and Heavy Duty Constructions, we can supply light weight drums made up to suit your needs.

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ERNEST JACOBY & CO.

Crude Rubber	*Liquid Latex*
Crown Rubber Clay	*Carbon Black*
Rubber Chemicals	*Rubber Colors*

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R. K. O. BUILDING, RADIO CITY, NEW YORK, N. Y.
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"PIONEERS OF THE INDUSTRY"

CHEMICAL MARKETS

New York, Sept. 14, 1943
All Prices F.O.B. Works

ACCELERATORS

Organic			
A-1 (Thiocarbanilid)	lb.	.28 @	.33
A-10	lb.	.36 @	42
A-19	lb.	.52 @	.65
A-32	lb.	.60 @	.70
A-77	lb.	.42 @	.55
A-100	lb.	.42 @	.55
Aldehyde ammonia, crystals	lb.	.65 @	.70
Altax	lb.	.43 @	.45
Beutene	lb.	.59 @	.64
B-J-F	lb.	.38 @	.43
Butyl Zimate	lb.	— @	1.13
Captax	lb.	.38 @	.40
Crylene	lb.	.40 @	.47
Di-Ortho-Tolyguanidine	lb.	.44 @	.46
Diphenylguanidine	lb.	.35 @	.36
El-Sixty	lb.	.40 @	.47
Ethyl Zimate	lb.	— @	1.13
Ethylidine aniline	lb.	.42 @	.43
Formaldehyde aniline	lb.	.31 @	—
Guantal	lb.	.40 @	.50
Hepteen	lb.	.34 @	.39
Hexamethylenetetramine	lb.	.33 @	—
Lead Oleate, No. 999	lb.	.13 @	—
Witco	lb.	.15 @	—
Ledate	lb.	— @	1.48
Methyl Tuads	lb.	— @	1.53
Methyl Zimate	lb.	— @	1.23
Monex	lb.	— @	1.53
Pentex	lb.	.74 @	.84
Phenex	lb.	.50 @	.55
Pip-Pip	lb.	— @	1.65
R & R 50-D	lb.	.42 @	.43
R-2	lb.	1.40 @	1.80
R-2 Crystals	lb.	1.55 @	1.70
Rotax	lb.	.48 @	.50
Safex	lb.	1.15 @	1.25
Santocure	lb.	.60 @	.67
Selenac	lb.	— @	1.98
SPDX	lb.	.70 @	.75
Super-Sulfur No. 2	lb.	.13 @	.15
Thiocarbanilid, drums	lb.	.28 @	.33
Thiurad	lb.	— @	1.55
Trimene	lb.	.54 @	.64
base	lb.	1.03 @	1.18
Triphenylguanidine	lb.	.45 @	—
Ulto	lb.	1.25 @	1.75
Ureka	lb.	.50 @	.75
Blend B	lb.	.50 @	.57
Blend C	lb.	.48 @	.55
Vulcanex	lb.	.42 @	.43
Vulcanol	lb.	.85 @	—
Inorganic			
Litharge, domestic	lb.	.07 @	.07½
Magnesia, calcined, heavy	lb.	.04 @	—

COLORS

Blacks (See Next Column)			
Blues [b]			
Prussian	lb.	.36 @	—
Ultramarine	lb.	.17 @	.27
Browns [b]			
Mapico	lb.	.1135@	—
Umber, Turkey	lb.	.04¼ @	—
Greens [b]			
Chrome	lb.	— @	.25
Guignet's Green	lb.	.70 @	—
Reds			
Antimony			
crimson, 15/17	lb.	— @	—
sulfur, free	lb.	— @	—
Indian	lb.	.08¾@	—
Domestic (Maroon)	lb.	.11 @	—
Mapico	lb.	.096 @	—
Red oxide, pure	lb.	.10 @	.12
Rub-Er-Red	lb.	.09¾@	—
Whites [b]			
Cryptone No. 19	lb.	.0560@	.0585
Cryptone CB No. 21	lb.	.0560@	.0585
Cryptone ZS-800	lb.	.0825@	.0850
Lithopone:			
Albalith	lb.	.04¼ @	.04½
Astrolith	lb.	.04¼ @	.04½
Azolith	lb.	.04¼ @	.04½
Ray-cal	lb.	.05½ @	.05¾
Rayox	lb.	.14½ @	.15¼
Titanox A	lb.	.14½ @	.14¾
Titanox B	lb.	.05¾@	.06
Titanox C	lb.	.05½ @	.05¾
Zinc Oxide—American Process [b]			
American Azo:			
ZZZ (lead free)	lb.	.07¼ @	.07½
Anaconda, lead free	lb.	.07¼ @	.07½
Horsehead Lead Free Brand:			
Special—3	lb.	.07¼ @	.07½
XX Red—4	lb.	.07¼ @	.07½
XX Red—72	lb.	.07¼ @	.07½
XX Red—103	lb.	.07¼ @	.07½
Kadox, black label—15	lb.	.07¼ @	.07½
Red label—17	lb.	.07¼ @	.07½
St. Joe, black label	lb.	.07¼ @	.07½
green label	lb.	.07¼ @	.07½
red label	lb.	.07¼ @	.07½
U. S. P.—7, bbls.	lb.	.10½ @	.10¾

[a] Price Ceilings.
[b] Price Suggestions or Agreements.

Zinc Oxide—French Process: [b]			
Florence White Seal—7 bbl.	lb.	.09½ @	.09¾
Green seal—8	lb.	.09 @	.09¼
Red seal—9	lb.	.08½ @	.08¾
Yellows [b]			
Cadmolith	lb.	.55 @	.60
Chrome	lb.	— @	.50
Mapico	lb.	.071 @	—

BLACKS
(In bags, carload lots)

Aerfloted Arrow	.0355@	—
Atlantic	.0355@	—
Certified	.0355@	—
Certified Spheron	.0355@	—
Channel "S"	.12 @	—
Continental	.0355@	—
Disperso	.0355@	—
Dixiedensed	.0355@	—
Dixiedensed 66	.0355@	—
Excello	.0355@	—
Furnex	.03½@	.06
Furnex Beads	.03½@	.06
Gastex	.03½@	.06
Kosmobile	.0355@	—
Kosmobile 66	.0355@	—
Kosmos-Dixie 20	.03½@	.06
Micronex (Amarillo)	.0355@	—
Micronex Beads (Amarillo)	.0355@	—
Pelletex	.03½@	.06
P-33	.0475@	—
Shell Carbon (Del. Midwest)	.0240@	—
Sterling	.035 @	—
Supreme	.0355@	—
Thermax	.0225@	—
Thermax "S"	.0675@	—
Wyex	.0355@	—

COMPOUNDING MATERIALS

Aluminum Flake	ton	18.00	@24.50
99½%-300	ton	—	@16.50
86-90%-300	ton	—	@13.50
Asbestine	ton	16.50	@20.00
Atomite	ton	—	@27.50
Barium carbonate (98-100%)	ton	47.00	@49.00
Barytes	ton	25.35	@36.00
Bentonite	ton	11.00	@16.00
Blanc fixe, dry	ton	60.00	@67.50
Calcene	ton	37.50	@43.00
Catalpo (fact)	lb.	.02	@ —
Chalk, precipitated			
Suprex white	ton	32.50	@45.00
Clay, Aerfloted, Suprex	ton	10.00	@22.50
Aerfloted Paragon	ton	10.00	@22.50
Crown	ton	10.00	@ —
Dixie	ton	—	@10.00
Kaolloid	ton	—	@ 9.00
Langford	ton	—	@ 8.50
McNamee	ton	—	@10.00
Par	ton	—	@10.00
Witco	ton	10.00	@ —
Kalite No. 1	ton	—	@26.00
Kalite No. 3	ton	—	@36.00
Kalvan	ton	—	@100.00
Kalvan "S"	lb.	—	@ .09½
Keystone white	ton	—	@14.00
Magnesium carbonate	lb.	.06¼	@ —
Mineralite	ton	—	@30.00
Pyrax A	ton	—	@ 7.50
Rottenstone (powd. Dom.)	ton	25.50	@37.50
Rubberol	lb.	—	@ .17½
Silene EF (calcium silicate)	lb.	.055	@ .06
Snowflake white	ton	—	@16.00
Talc, domestic	ton	17.00	@25.00
Whiting, commercial	ton	16.00	@26.00
Witco	ton	6.00	@ —
Witcal	ton	—	@100.00
Witcarb R-12	ton	—	@40.00
Wood Flour (100 mesh)	ton	30.00	@32.00

MINERAL RUBBER

285°-300° Mineral Rubber	ton	25.00	@ —
Black Diamond	ton	25.00	@ —
Hard Hydrocarbon	ton	25.00	@27.00
MilliMar	lb.	—	@ .05½

MISCELLANEOUS

Aromatics—Rodo #0	lb.	4.00	@ 4.50
Rodo #10	lb.	5.00	@ 5.50
Curodex 19	lb.	2.75	@ —
Curodex 188	lb.	3.50	@ —
Curodex 198	lb.	4.50	@ —
Para-Dors	lb.	4.50	@ —
Aresklene No. 375	lb.	.35	@ .50
Darvan (dispersing agent)	lb.	.30	@ .34
Santomerse S	lb.	.11	@ .25
Sponge Paste	lb.	—	@ .18
Sunproof	lb.	.22¾	@ .27¾
Tackol (tackifier)	lb.	.085	@ .18
Tonox	lb.	.50	@ .59
Ty-Ply	gal.	6.75	@ 8.00
Unicel (blowing agent)	lb.	.50	@ —

SOFTENERS

Acids			
Acetic, 28%, bbls. [a]	100 lb.	3.38	@ 3.63
Nitric, 36 degrees	cwt.	5.00	@ —
Acids, Fatty			
Laurex	lb.	.14¾	@ .17¼
SL #10	lb.	.12	@ .14
Stearex Beads	lb.	.10	@ .11
Stearite	lb.	.10	@ —

Alkalies			
Caustic Soda, 76%	cwt.	2.70	@ 5.75
Soda Ash, 58%	cwt.	1.15	@ 2.95
Oils			
Degras, bbls.	lb.	.10	@ .12
Para-Flux	gal.	.17	@ .18
Para-Lube	lb.	.046	@ .048
Petrolatum, amber [b]	lb.	.03¾	@ —
Pigmentaroil, tank cars	gal.	.20½	@ —
in drums	gal.	.26½	@ .27½
Pine, tanks	gal.	.55	@ —
Rosin Oil, cmpd.	gal.	.40	@ —
Rubberol	lb.	.13½	@ .14
Rubtack	lb.	.10	@ —
Seedine, c.l.	lb.	.07¼	@ —
Witco Palm Oil	lb.	—	@ —
Witco Softener No. 20	gal.	.20	@ —
Woburn No. 8, c.l.	lb.	.06	@ —
Resins and Pitches			
Pitch, Burgundy	lb.	.06	@ —
coal tar	ton	19.00	@22.00
hardwood	ton	16.00	@22.50
pine, 200 lb. gr. wt.	bbl.	—	@ 4.50
Pigmentar, tank cars	gal.	.20½	@ —
in drums	gal.	.26½	@ .27½
Retort Pine Tar, drums	gal.	.26½	@ .27½
Solvents			
Acetone, pure [a]	lb.	.07	@ —
Benzene, 90%, tank car	gal.	.14	@ —
Beta-Trichlorethane	gal.	—	@ .20
Bondogen	lb.	.98	@ 1.05
Carbon, bisulfide	lb.	.05	@ .08½
Carbon tetrachloride	gal.	.83	@ 1.27
Dichlorethylene	lb.	—	@ —
Dipentene, cml., drums	gal.	.48	@ .50
Ethylene dichloride	lb.	.07½	@ .08½
Plastogen	lb.	.07¾	@ .08
Reogen (drums)	lb.	.11½	@ .12
Rub-Sol	gal.	.09½	@ —
Trichlorethylene	lb.	.08	@ .09½
Turpentine, spirits	lb.	.78½	@ —
dest. dist., drums	gal.	.50	@ .55
Waxes			
Beeswax, white [b]	lb.	.58	@ —
Carnauba, yellow [b]	lb.	.83¾	@ —
Ceresin, white, dom.	lb.	.13½	@ .15
Montan, crude	lb.	—	@ —
Paraffin [a]			
Yellow crude scale, 124/126	lb.	.04¼	@ —
Refined, 123/125	lb.	.05¼	@ —

ANTI-OXIDANTS

Agerite Alba	lb.	1.95	@ 2.05
Gel	lb.	.52	@ .54
Hipar	lb.	.61	@ .63
Powder	lb.	.43	@ .45
Resin	lb.	.43	@ .45
Resin D	lb.	.43	@ .45
White	lb.	1.23	@ 1.33
Albasan	lb.	.69	@ .74
Antox	lb.	.54	@ .56
B-L-E	lb.	.43	@ .52
Flectol H	lb.	.52	@ .65
Flectol White	lb.	.90	@ 1.15
Neozone A, B, C, D, E	lb.	.43	@ .63
Oxynone	lb.	.77	@ .90
Retardex	lb.	.45	@ .48
Santoflex B	lb.	.52	@ .65
Santoflex BX	lb.	.54	@ .64
Santovar O	lb.	1.15	@ 1.40
S.C.R.	lb.	.33	@ .35
Stabilite	lb.	.52	@ .54
Stabilite Alba	lb.	.70	@ .75
VGB	lb.	.43	@ .52

EXTENDERS

Naftolen	lb.	.15	@ .25
Vanzak	gal.	.05	@ .06

LUBRICANTS—MOLD & RUBBER SURFACE

Aresklene	lb.	.35	@ .50
Cocoa Soapstock	lb.	.06	@ .08
Colite	gal.	.90	@ 1.15
Dipex	lb.	.06	@ .08
Glycerized Liquid Lubricant	gal.	—	@ 1.35
Lubrex	lb.	.25	@ .30
Mineralite	ton	—	@30.00
Sericite	ton	65.00	@75.00
Soap Tree Bark, cut, sifted	lb.	.06	@ .08

FACTICE OR RUBBER SUBSTITUTES

Amberex	lb.	.25	@ —
Amberex Type B	lb.	.18¾	@ —
Black	lb.	.08½	@ .13
White	lb.	.09	@ .15
Brown	lb.	.10	@ .14
Neophax A	lb.	.16½	@ —

VULCANIZING INGREDIENTS

Dispersed Sulfur No. 2	lb.	.08	@ .12
Sulfur Chloride, yellow (drs.)	lb.	.03	@ .08
Sulfur, rubber makers			
Refined (bags)	cwt.	2.55	@ —
Commercial (bags)	cwt.	2.20	@ —
Telloy	lb.	1.75	@ —
Vandex	lb.	1.75	@ —

for Neoprene Compounding

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1 **UNIFORM** wetting power and ease of dispersion

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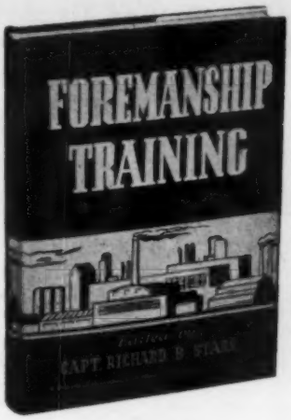
Phillipsburg, New Jersey



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In Canada: Prescott & Company, Montreal

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The Market Place

If what you are seeking is not listed here, write to the Service Department of THE RUBBER AGE, 250 West 57th St., New York 19, N. Y.

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ACCELERATORS—
El-Sixty; Ureka; Ureka C; Guantal; Santocure; DPG; Pip Pip; A-10; A-32; A-46; A-100; R-2 Crystals • ANTIOXIDANTS—Flectol H. White; Santoflex B, BX; Santovar A.
MONSANTO CHEMICAL CO.
Rubber Service Dept.
1012 Second National Bldg., Akron, Ohio

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A Grade for Every Requirement
CONTINENTAL "AAA"—Low heat generating, extremely easy processing. "AA"—Low heat generating, easy processing. "A"—Medium cure, medium processing. "D"—Standard Channel Black.
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Accelerators, Extenders, Plasticizers, Tackifiers for Natural Rubber & Synthetics; also Mold Lubricants, Latex Thickeners, Wetting Agents, etc.
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245 Fifth Ave., New York 16, N. Y.

AERO BRAND
RUBBER CHEMICALS
DPG—DOTG—Accelerator 49
Rubber Sulphur
American Cyanamid & Chemical Corporation
30 Rockefeller Plaza, New York, N. Y.

CARBON BLACK—Aerfloted
WYEX — TX — HX
Compressed — Compact (Dustless)
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Carbon Black—Clay—Colors
Accelerators—Sulphur
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A uniform, fine, low gravity, white reinforcing pigment. *Furnished to the rubber trade for 40 years.*
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Distributed by
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For Rubber		For Industry Generally
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Antioxidants	*Oil of Myrbane*	*Lotol*
Specialties	*Aniline Oil*	*Dispersions*

NAUGATUCK CHEMICAL
Division of United States Rubber Co.
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"Alorco" Hydrated Aluminas reinforcing pigments give many desirable properties to rubber. Send for sample.
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Clairton Penna.

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Rare Metal Products Co.
Belleville, N. J.
Direct Factory Representation

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and DUSTLESS and a
Complete Line of High Quality
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The Market Place

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Chemicals and Compounding Materials (continued)

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COLLOIDAL COLORS

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Akron Ohio

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Accelerators	Clays
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A neutral gum for rubber compounding.
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Attrition Mills; Conveyors; Crushers; Cutters; Elevators; "Frigidisc" Grinders; Hammer Mills; Mixers, Sifters, etc.
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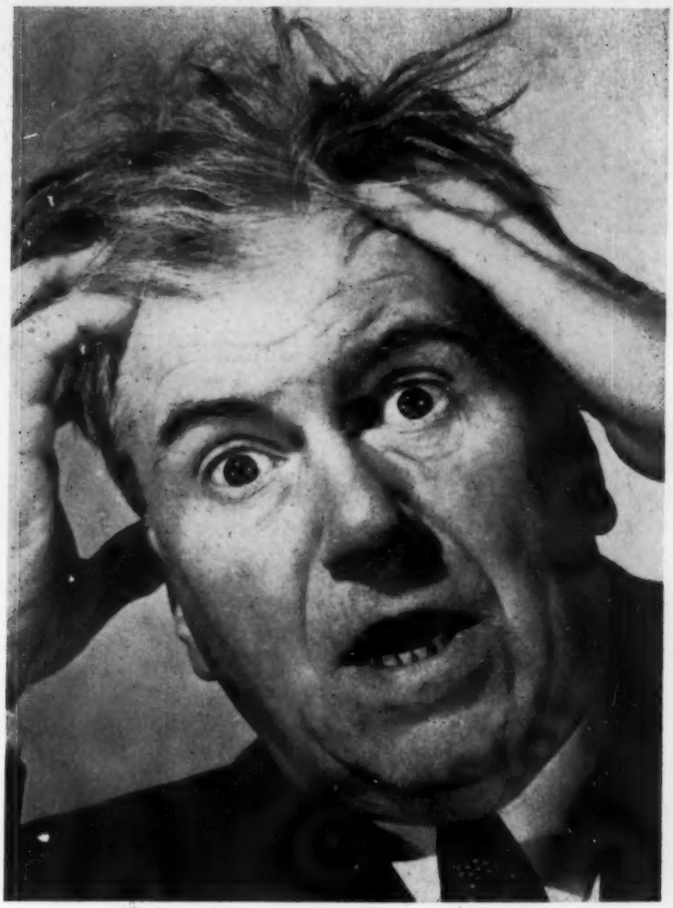

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